THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXVI. No. 635.] LONDON, JULY 13, 1875. [27TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas: 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
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GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
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GENUINE TORBAY PAINT
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SPECIAL GASOMETER PAINT
(Mixed ready for use).
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
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Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL, OR ELSE NO MONEY TAKEN FOR THE CONTRACT.
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Presented by Her Majesty's Government to the French Government;
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Warranted to Measure correctly, and not to vary.
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G. G. and Co. have just received the only Medal awarded for Gas-Meters at the Vienna International Exhibition.

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N.B.—A Stock of 15 and 18 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

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Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

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THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

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TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

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GAS-FITTERS TOOLS, VALVES, COCKS, &c.

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IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

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EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

JOHN WRIGHT AND CO., ESSEX WORKS, BIRMINGHAM,

Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

COPY OF LETTER RECEIVED FROM MAGNUS OHREN, Esq.

Crystal Palace District Gas Company, Lower Sydenham, S.E.

To Messrs. John Wright and Co., Essex Works, Birmingham.

Dear Sirs,—In reply to your inquiries, I am glad to state that the use of GAS COOKING AND HEATING STOVES has been a complete success here. We have several hundred in use in our districts. We also find it advantageous to let out Stoves at a small rental. We have now 275 Stoves at rent.

The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, yours faithfully, MAGNUS OHREN.

Size, 25½ in. high; 14 in. wide; 12½ in. back to front.

Price 80s., complete with Pan and Gridiron.

GAS HEATING STOVES

(TERRA COTTA AND IRON).

THE CHEERFUL STOVE.

COOKING STOVES.

BREAKFAST COOKERS.

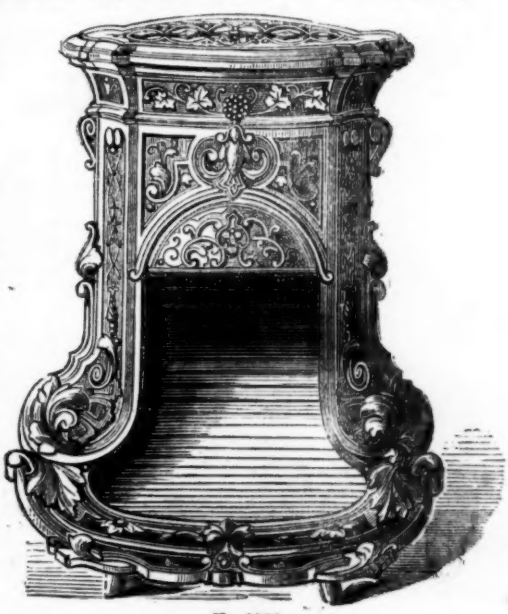
BATHS HEATED by GAS

GAS STOVES

For Boiling, Broiling, Preserving, Heating Flat Irons, and for all other Domestic Purposes.

Gas Companies and the Trade who have not our Illustrated Catalogue are respectfully requested to apply for same.

A LIBERAL DISCOUNT to the TRADE.



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THE CHEERFUL GAS STOVE, with Copper Reflector,
Has all the appearance of a Bright Fire.
PRICE from 32s.

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

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Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

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IMPORTERS OF

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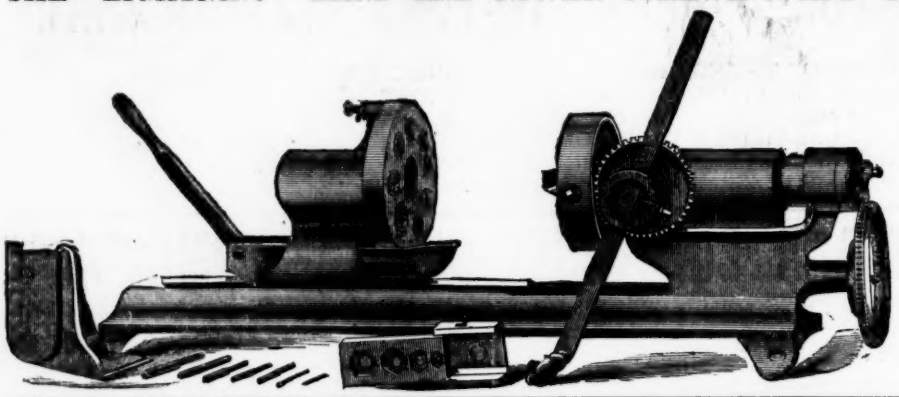
"TANITE" COMPANY'S SOLID EMERY WHEELS AND MACHINERY,

85, QUEEN VICTORIA STREET, LONDON, E.C.

THE "LIGHTNING" HAND AND POWER SCREWING AND TAPPING MACHINES.



They finish their work at one cut.

Nuts and bolts threaded with them always correspond, without trying and fitting.

The dies are adjustable for wear.

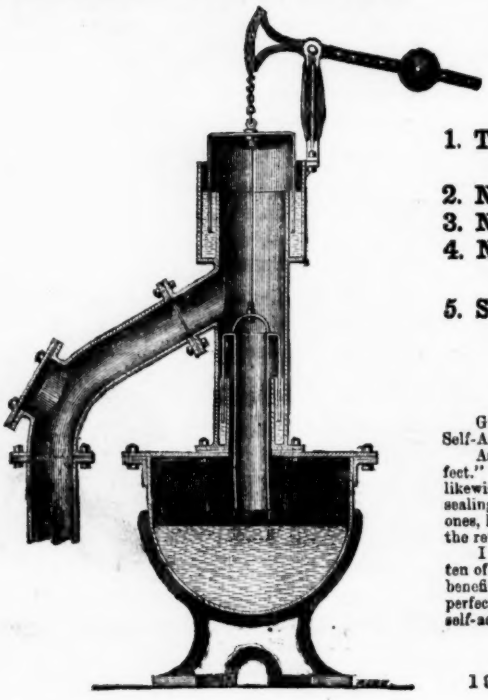
They thread 30 $\frac{3}{4}$-in. bolts, and tap 30 $\frac{3}{4}$-in. nuts, in 40 minutes—a day's work by hand.

They may be used, if pipe-dies ordered, for threading pipes as well.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. **There is no pressure on the Retorts.**
2. **No deposit of Carbon.**
3. **No scurfing is required.**
4. **Never a choked Ascension-Pipe.**
5. **Saves Fuel and Wear and Tear.**
6. **Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.**
7. **Is never out of order.**
8. **Requires no attention.**
9. **Is perfectly automatic in its action.**

TESTIMONIAL.

Metropolitan District Asylum, Caterham, Surrey, Dec. 14, 1874.

MESSRS. CHANDLER AND STEVENSON.

GENTLEMEN,—I have much pleasure in bearing testimony to the complete working of your "Patent Self-Acting Dip-Pipes," which have now been in constant operation over three months.

As regards the action of the apparatus, I can describe it no better than by calling it "simply perfect." Immediately the retort is charged and the lid secured, the small holder rises, which lifts the Dip; likewise the instant the gas is permitted to escape at the mouthpiece the holder falls, thus perfectly sealing the Dip. I am fully convinced of the superiority of these Self-Acting Dips over Non Self-Acting ones, having experienced the fact that stokers do occasionally neglect to unseal the Dip after charging the retort, thereby causing a waste or loss.

I feel that it is quite unnecessary for me to say more on the subject, excepting that, having had ten of Messrs. Chandler's Dip-Pipes in use more than one year, and having experienced the great benefits derived thereby, inasmuch as the yield of gas from the coal is greatly increased, and the retorts perfectly free from carbon and other advantages, and seeing that the same Dip has been made perfectly self-acting by the second patent, I feel convinced that this is the right thing.—Yours obediently,

W. CRICKMAY, Resident Engineer.

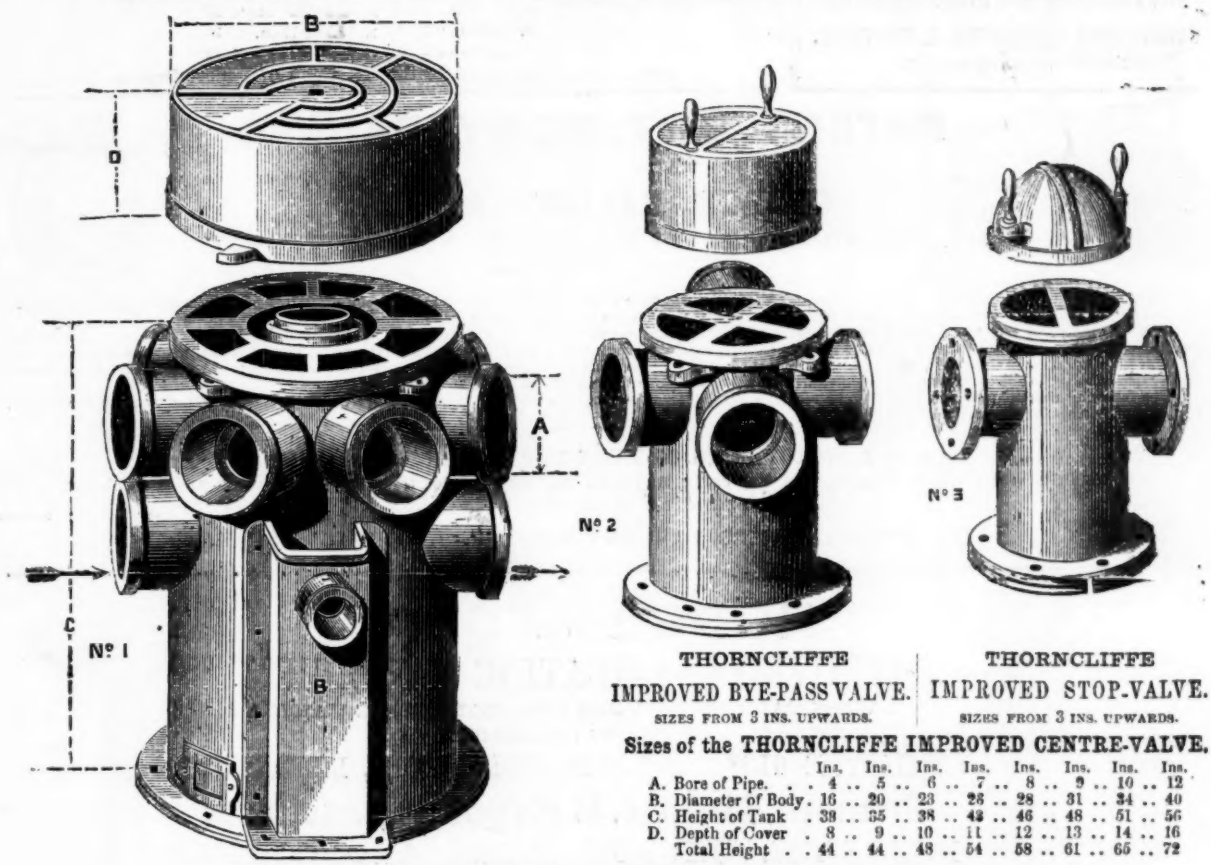
For terms of use and cost, apply to Mr. G. W. STEVENSON,

19, GREAT GEORGE STREET, WESTMINSTER.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.



THORNCLIFFE IMPROVED BYE-PASS VALVE. SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE IMPROVED STOP-VALVE. SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 .. 12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 .. 40
C. Height of Tank .	38 ..	35 ..	38 ..	42 ..	46 ..	48 ..	51 .. 56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 .. 16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 .. 72

In all cases the Covers are cast heavy enough to resist any required pressure.

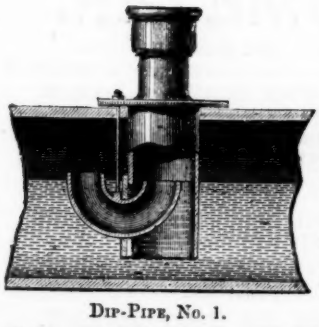
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



DIP-PIPE, No. 1.

Messrs. N., C., and Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING HYDRAULIC DIP-PIPES.

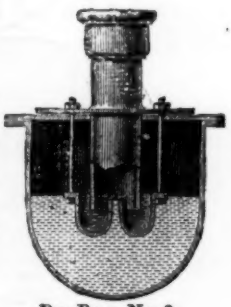
By their use the whole of the pressure caused by the Seal in the Hydraulic Main is entirely avoided, thus securing the many advantages long sought for.

Over 50 Gas Companies have already been supplied with them, many of which have been using them throughout their entire works continuously for over two years.

They can be applied to existing Hydraulic Dips, and at a very small cost.

They seal themselves in the same manner as the ordinary dip-pipes, therefore they are not likely to get out of repair.

By the aid of the adjusting screws they can be made to work on the old principle at pleasure.



DIP-PIPE, No. 2.

FOR PRICES, TESTIMONIALS, &c., APPLY TO

Messrs. NEWTON, CHAMBERS, & CO., Thorncliffe Iron-Works, near Sheffield, Sole Agents;

OR TO THE PATENTEE,

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STOURBRIDGE (Established 1834),

MANUFACTURER OF EVERY DESCRIPTION OF

Burs, Lumps, Stays, Shields & other Bricks, & Gas-Retorts,

A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular . 14 in., 15 in., 16 in., 18 in.
Ovals . . 17 in. × 14 in., 17 in. × 15 in., 20 in. × 15 in., 21 in. × 15 in., &c.
D's. . . { 14 in. × 14 in., 15 in. × 12 in., 15 in. × 13 in., 17 in. × 14 in., 18 in. × 13 in.
{ 18 in. × 15 in., 20 in. × 16 in., 22 in. × 14 in., 24 in. × 14 in., 24 in. × 15 in., &c.

Special attention given to the execution of Export Orders.

1862.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

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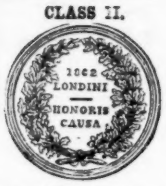

This Paint having been in general use over thirteen years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced or resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

The following Gas Companies in London have used the Paint for years—viz., The Gaslight and Coke, Imperial, Independent, City of London, Commercial, London, and Surrey Consumers.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

SPECIAL DRIERS FOR ANTIMONY PAINT SUPPLIED.

HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES

TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

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Drawings and Prices upon application.

PRIZE MEDALS—1862, 1867, 1871, 1874.

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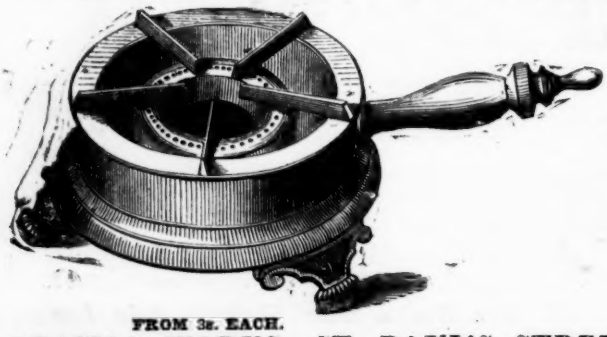
SOLE LICENSEES AND AGENTS FOR GREAT BRITAIN FOR

GIROUD'S PATENT RHEOMETER.



This Instrument is easily fixed under any Burner; it regulates the volume of Gas to be consumed, notwithstanding the Size of the Burner or the Variation of Pressure.

Full particulars on application, also Pamphlets on the

"ADVANTAGES OF COOKING AND HEATING BY GAS."

With Illustrations, &c., of the latest and most improved

GAS KITCHENERS, GRILLERS, COOKING STOVES, REGISTERED BOILING STOVES (See Margin); also the NEW SAFETY PATENT TUBULAR GAS BOILERS.

LIBERAL TERMS TO THE TRADE.

FROM 3s. EACH.

ADAMAS WORKS, ST. PAUL'S STREET, NEW NORTH ROAD, LONDON, N.

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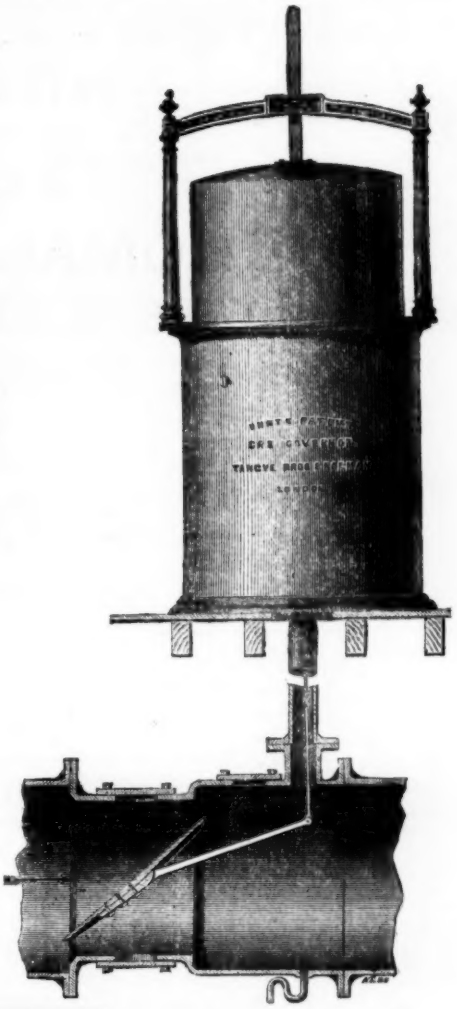
SOLE MAKERS OF

HUNT'S PATENT EQUILIBRIUM GAS GOVERNOR.



In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by several leading Gas Companies, among whom are the following:—

The Gaslight Co.—two 36 in. at Blackfriars.
" " a 36 in. at Goswell Road.
" " a 24 in. at "
" " a 24 in. at Whitechapel.
" " an 18 in. at Bow Common.
" " a 24 in. at Beckton.
" " a 6 in. at "
The London Gas Co.—a 24 in. at Nine Elms.
" " an 18 in. at "
" " an 8 in. at "

The Exeter Gas-Works—a 24 in.
" Abergavenny Gas-Works—a 10 in.
" Birmingham Gaslight Co.—an 8 in.
" Monmouth Gas-Works—an 8 in.
" Devonport Gas-Works—an 8 in.
" Cannes Gas-Works—an 8 in.
" Mentone Gas-Works—an 8 in.
" Rochdale Gas-Works—a 4 in.
" Imperial Gas Co., a 12 in at Great Cambridge Street.

TESTIMONIAL.

The Gaslight and Coke Company, 9, Water Street, New Bridge Street, Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,
(Signed) JOHN JOHNSON.

VIENNA EXHIBITION, 1873.—The highest prize and only Medal "for Progress" for Direct-Acting Steam Pumps for general purposes was awarded to TANGYE BROTHERS AND HOLMAN, Engineers, London, for

THE "SPECIAL" DIRECT-ACTING STEAM PUMPS.

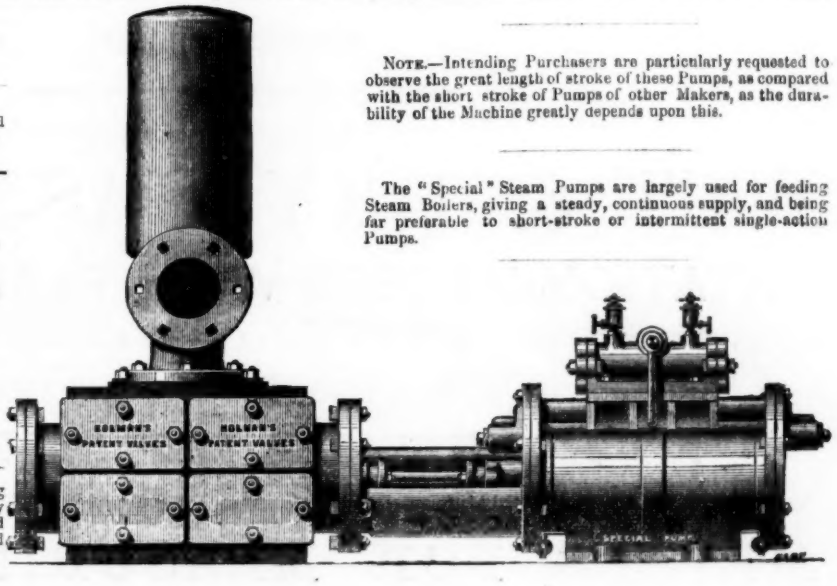
Upwards of 12,000 have been sold in England and America.

In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

The following are a few of the leading Sizes:—

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4*	2	9	815	18
3	3	9	1,830	18
5*	3	12	1,830	22 10
4	4	12	3,250	25
6*	4	12	3,250	30
5	5	12	5,070	32 10
7*	5	12	5,070	40
6	6	12	7,330	40
8*	6	12	7,350	50
7	7	12	9,750	50
10*	7	12	9,750	65
8	8	18	13,000	65
10	9	18	16,500	80
10	10	24	20,000	100
12	12	24	30,000	140

* These sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance piece between steam and pump cylinder at a small extra cost.



NOTE.—Intending Purchasers are particularly requested to observe the great length of stroke of these Pumps, as compared with the short stroke of Pumps of other Makers, as the durability of the Machine greatly depends upon this.

The "Special" Steam Pumps are largely used for feeding Steam Boilers, giving a steady, continuous supply, and being far preferable to short-stroke or intermittent single-action Pumps.

London 1851. New York, 1853. Paris, 1855. London, 1862.

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PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

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THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
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4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

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(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

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WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

R. A. GREEN (Carrickfergus) AND OTHERS.—*The publication of the "Treatise" has been necessarily suspended while our columns are loaded with parliamentary matter. The engravings asked for have been executed, and will be given as soon as we can find space for them.*

NOTICES TO SUBSCRIBERS.

An Index and Title-Page to the First Half-Yearly Volume of the JOURNAL for 1875 is furnished with this number, and cloth cases for binding may be obtained on order from any bookseller, or from the Publisher.

Subscribers who desire to avail themselves of the reduction in the subscription to the JOURNAL by paying in advance for the second half of the year 1875, are reminded that this can only be done during the present month.

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THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 13, 1875.

Circular to Gas Companies.

We are still left in doubt as to what may be the fate of the Metropolis Gas Companies Bill. It is on the paper again for this (Monday) evening, but with so many Government orders of the day before it, that the probability of its being proceeded with is very remote. The Premier, seeing the great arrears of public business, is not at present disposed to give up an evening for a discussion that will necessarily occupy the greater part of a sitting; and we may be sure that the watchful opponents of the Bill will not allow it to slip through by any parliamentary trick.

It may be confessed that the passing of the Commercial Company's Bill without much show of opposition, and without a division, is a sort of triumph for the Metropolitan Board. The Bill contains all those provisions in the general measure which we regard as obnoxious, unjust, and prejudicial to the legal rights of the companies, and their adoption by the House of Commons in this case might be taken to imply an opinion in the House in favour of the general Bill. It must not be allowed, however, that one company shall legislate for all the others. If the Commercial Company are willing, as Colonel Beresford put it, to attempt to work miracles or to commit suicide, they are quite at liberty to do either; but it cannot be expected that other companies will agree to follow their example. The opposition to the general measure, therefore, will not be in the least degree relaxed, but rather increased. The fact must be represented that it is grossly unfair to put all the companies under one general enactment of this kind. Their conditions are so diverse, that what is a boon to one is an injustice to another. The 3s. 9d. per 1000 feet, which is a substantial advantage to the South Metropolitan, may, and probably will, prove the reverse of advantageous to the Chartered and Imperial Companies. These latter stand on a perfectly different basis to the former, and to subject all alike to the same conditions is, we say, unjust. It cannot be contended for a moment that the upward and downward sliding scale puts the companies on an equal footing. It will produce a bonus for some, and inflict a penalty on others. We are not without hope that, the more this obnoxious provision is considered, the more clear the injustice it involves will be seen; and, notwithstanding that the Commercial Company have, for reasons best known to themselves, agreed to accept it, the House of Commons, we are satisfied, will be slow to force it upon the companies who do not approve it, and justly consider that its enactment would be a breach of faith.

We shall not venture to prophesy, but, remembering the strong assurance given by the Chancellor of the Exchequer, in the name of the Government, we must still retain a strong hope that the Bill will be rejected. We have the greatest respect for the select committee, who have reported in favour of the measure; but they are men, and fallible. If this committee are right, Mr. Cardwell's and more recent committees were wrong; so, too, were the committee who settled the Act of 1860. And all these committees included prominent members of the House of Commons.

The opinion of Mr. Forster and his colleagues appeared to be that gas undertakings should be managed on strictly commercial principles, although the chairman admitted that the ordinary laws of trade would not apply to them. We shall consider now but one suggestion put forth—viz., the possible increase of profits by an increased consumption of gas. There is no possibility of a gas company largely adding to their business by reducing their price, and making increased profits from increased demand. Here in London the demand for gas only grows with the metropolis, and no price it could possibly be produced at would much stimulate the consumption while petroleum remains so cheap. There is, indeed, a certain normal rate of increase in consumption, which appears to be nearly the same all over the country, and which appears to be unaffected by price. On this alone can gas companies rely for an extension of their trade. We have thus no reason for believing that, in the case of this article of gas, cheapness of supply would increase demand. Thus the first argument for the application of strictly commercial principles breaks down. We shall not pursue this part of the subject further to-day, or we might point out the probability that a considerable increase in the demand for gas would lead to an advance of price. Most of the metropolitan works are now in mid-winter utilized to their utmost capabilities, and a much larger consumption of gas would necessitate a very large expenditure of capital for additional works. In these days it is very difficult to find a convenient site for gas-works around London. There is a desire on the part of the public to push gas-works further and further from town; and, wherever a company go, they meet with opposition. Land gets dearer and dearer, and distance of works from the district to be supplied involves a great outlay. Thus, even supposing maximum dividends to be reduced to 5 per cent., we do not then see that a large demand for gas would lessen the price. Nothing seems clearer than the fact that a large production of coke seriously depreciates the money value of that article, and the cost of gas is greatly influenced by the sum obtained for coke. Half a dozen Becktons round London would bring down the value of coke to next to nothing. Another probability must not be overlooked. An increased demand for gas coal might send up the price of that article. It may be taken as certain that the demand for cannel which will arise if 16-candle gas be universally supplied in London, will cause next year an advance in the price of that particular coal.

Whenever the Bill comes on, we have no desire but that the discussion should be full and fair. There may be a lack of attractive oratory on the occasion, but Mr. Rodwell, Q.C., will, no doubt, put the case of the companies in the clearest light. Mr. Forster will, of course, take up the defence of the Bill, and try to justify the select committee in the decision they have come to. Mr. Cawley, whose position as an eminent gas engineer is *unique* in the House, may be expected to join in the debate, and although, as an ex-chairman of the Gas Committee of the Corporation of Salford, his prepossessions may be supposed to be in favour of corporate undertakings, we are certain that his large acquaintance with gas companies, and the laws under which they work, will enable him to do the metropolitan companies full justice. Mr. Cawley evidently sees a remedy for the present state of affairs in further amalgamations. This is opposed on the

ground that, up to this time, amalgamations have not produced results favourable to the consumer. We are, nevertheless, firm believers in the advantages to be derived from amalgamation. When an acknowledged specific does not produce its effect, it is a simple sign that the patient has not taken enough of it.

As regards the amendments to be proposed, we can only repeat what we said last week. We should prefer Mr. Young's proposal of the prices of the Act of 1860, with some simple machinery for controlling advances. Failing this, we might content ourselves with a low standard price and the revision clauses of the Acts of 1868–9. But, supposing the House should, in their wisdom, determine on the retention of the sliding scale, we should be, in a measure, contented with the range of price proposed by Colonel Beresford.

The only additional amendment put on the paper, since our last, is a curious one by Mr. Boord, which, if carried, would give the accountants of the Metropolitan Board of Works some little trouble. It is to the effect that none of the expenses of promoting the Bill, or carrying it into effect if passed, shall be charged by the Metropolitan Board upon any part of the metropolis beyond the limits of the Metropolis Gas Act, 1860. There are, evidently, some very sharp people among Mr. Boord's constituents.

The Dudley Gas Company having intimated their willingness to dispose of their undertaking to the Corporation, the mayor has been directed to ascertain from the company the terms they desire, and communicate the results of the correspondence to the Town Council. Except as another illustration of a general tendency, this projected purchase would not call for notice. Dudley is following in the wake of Birmingham, the mayor of the former quoting the mayor of the latter, to the effect that "there was not "a corporate body in the whole kingdom, that had acquired the "control of gas property, that had not made it a success, and were "able to do more for the consumers!" We shall not stop now to contest the point. The Dudley Corporation are welcome to the gas undertaking if they, like the Corporation of Birmingham, will pay a fair price for it.

But every gas undertaking in the hands of a local authority is not invariably a success. The Heywood Local Board lost £1860 on their gas undertaking last year, and have been trying to find out the reason. One cause alleged was dear coal; another was imperfect manipulation—that is, bad carbonization from low heats in the retorts; a third was the purchase of bad coals by the Board. In the end, the Board "gave "it up," confirmed the minutes, and went their ways. Let us hope that a better success will await this year's operations.

Mr. Hawksley has made a report on the gas undertaking of the Corporation of Halifax, for which we cannot find space at present, but which contains some interesting facts that may be quoted. The total length of mains is 91 miles, distributing to a population of less than 1000 to the mile, whereas commonly, in manufacturing districts, the population is from 1500 to 2000 to the mile. Again, at Halifax only 2¾ million cubic feet of gas per annum pass through each mile of main, while, in many manufacturing towns, from four to five millions of feet are transmitted through each mile of pipes. On this account, and for other reasons stated, the capital expended at Halifax in street work is necessarily larger than in many other towns. As regards the amount of capital it is necessary to spend on gas plant, Mr. Hawksley states that it is known to him, as a practical fact, that the total amount of capital necessary to be employed in constructions and working operations in a town circumstanced like Halifax, is not less than 2s. 6d. per cubic foot of the quantities fairly capable of being manufactured and distributed in the course of a mid-winter's day. The estimated capability of the Halifax works is 1,800,000 feet per diem; *primâ facie*, therefore, the capital should be £225,000. The amount standing in the books of the Corporation is £230,000, which includes £20,000, the value of land not yet occupied. Mr. Hawksley decides, therefore, that the amount of capital is not excessive, and he goes on to state that a valuation, based on actual quantities, showed that the capital, fairly represented by land, structures, and plant, amounts to £234,939. The report must be eminently satisfactory to the Corporation of Halifax.

There seems to be a lull in the gas agitation at Swansea, and, base-born as it was, we may, perhaps, hear no more about it. The company continue to satisfactorily fulfil their obligations. The statutory illuminating power being 11 candles, the Corporation examiner reports that the average power for the past month was 13·14 candles, the minimum being 11·60 candles. On the whole, the quality of the gas was very evenly maintained, which is always a good sign.

The Burghs and Populous Places (Scotland) Gas Supply Bill (No. 2) has, as we prophesied would be the case, been withdrawn, and so, for the present, ends the prospect of illegitimate competition and unjust confiscation in Scotland.

At the moment of going to press we receive our reporter's notes of the Premier's reply to the question of Sir J. Hogg, which will be found in another column. The Government, it seems, can afford no opportunity for the discussion of the Regulations Bill this session. We shall not now speculate on the possible consequences of this announcement; but we may advise the opponents of the Bill to be on the alert, as it may still be kept on the paper, and may be brought on at an unexpected moment.

Water and Sanitary Notes.

The metropolitan gas companies having had their worry, the water companies are now coming in for a share. In the House of Lords, last week, Lord Camperdown—who, by the way, is an excellent chairman of committee, when he keeps his temper—made an attack on the companies for charging rates according to assessments. As a matter of fact, the companies can charge upon no other principle. The grievance alleged is, that when a revaluation takes place, which always results in an increased assessment, the water companies raise their rates in proportion. This is perfectly fair, since the property of the companies is also revalued and assessed at a higher rate. We shall not contend that the principle of charging upon assessments is altogether satisfactory, and should hail the day with joy if water, like gas, could be universally supplied by meter. But, in the absence of this desideratum, we know of no better plan than charging upon assessments, which is, however, rating a consumer according to his supposed means of paying, rather than for the water consumed.

Lord Camperdown, of course, found fault with the capital of the companies, and, falling in with prevalent notions, would compel all new capital to be raised by way of loan. The dividends of the London water companies are not so high as to warrant complaints of this kind. Their average dividends are only about 6 per cent., and most of them would have to pay at least 5 per cent. for money on debentures. The New River Company cannot get money under 4 per cent. The saving, therefore, effected by raising money by loan, instead of shares, would be utterly insignificant in the case of the water companies.

Under a meter system, and a constant supply, gentlemen like Mr. Low, whose action against the Lambeth Water Company is reported in another column, might water their gardens to their hearts content, and do no injustice to any one. In reference to this case, we may mention that most Corporation Water Acts distinctly enact that a domestic supply does not include water for a garden, or for washing carriages, &c., nor, in some cases, water for washing the front of the house. If ever Mr. Low should be compelled to take his water from the Metropolitan Board of Works, he will probably find himself bound by restrictions of which he little dreams to-day.

We are sorry to say that the committee of the House of Lords have passed the preamble of the Birmingham Corporation Water Bill. They have, however, made an important amendment. Our readers will remember that the Bill, as passed by the House of Commons, would have given the Corporation power to purchase the water undertaking on terms fixed by themselves. This the Lords will not allow. They say that the terms must be fixed by arbitration, which is a decided gain to the company. Not having yet seen the amended Bill, we are in doubt whether the arbitration will be ordered under the Lands Clauses Act or the Companies Clauses Act, which may make some difference to the company.

There are people in Birmingham who are flattering themselves that the water supply will be vastly improved when it comes into the hands of the Corporation. We venture to predict that nothing of the sort will happen. The first result of the transfer will be the closing of the 15,000 private wells within the borough limits, the owners of which will be compelled to take their supply from the Corporation, and pay for it. This will be no great source of satisfaction to them. Most likely the Corporation will go to some great expense to improve the filtration of the water, which may be desirable, although grossly exaggerated statements have been made as to the condition of the company's supply. Altogether, we are of opinion that the population of Birmingham will not be, in any respect, benefited by the transfer. The fashion of the day has, however, been followed, and that will be a satisfaction to many.

The Rothesay Water Company (a non-statutory company) have just declined the offer of the Town Council to purchase their undertaking for £22,500. The paid-up capital of the company is £10,000; consequently, the sum offered by the council, if invested at 4 per cent., would have given the shareholders 9 per cent. on their original investment. We shall express no opinion as to the policy of the course pursued by the shareholders.

Correspondence.

VARIATIONS IN ILLUMINATING POWER.

Sir,—In your issue of the 6th inst., you publish a letter signed "C. T.," commenting upon a part of the evidence I gave before the committee on the Metropolis Gas Companies Bill. Kindly permit me to state, in reply, that I am at a loss to understand how "C. T." arrived at his conclusion, unless, indeed, he had not read the full report of the evidence. I stated in examination that between five and six p.m., on Dec. 12, 1874, there was a rise of 2·41 candles, and that the rise *apparently* took place during the six o'clock test. In cross-examination I stated that I could not give the extent of the rise in standard candles, as it was *impossible to tell at what rate the candles were burning at that period of the experiment*. I also stated that I considered the rise a physical possibility, because I had often observed a *considerable improvement in the gas flame* in the course of eight or ten minutes.

Moreover, I was confirmed in my belief that the difference in the readings was due to an improvement in the gas by the fact that the previous experiments gave much lower results, and the succeeding ones much the same as the one in which the rise occurred.

I am perfectly aware that the light given by the candles may vary during the experiment, but by experience and care the candles, provided they be not new ones, may be manipulated so as to give a tolerably regular light. In the case in question, the candles were burning very regularly, and showed no perceptible alteration during the experiment; whereas, had they been the cause of the difference, the diminution in the light they gave would have been easily observable.

Plaistow, Essex, July 7, 1875. W. C. Young.

THE POSSIBLE DIVIDEND OF THE SOUTH METROPOLITAN COMPANY.

Sir,—I observe, by your paper of the 6th inst., that, according to Mr. Field's published tables, the South Metropolitan Gas Company have been short of their dividend of 10 per cent. for the year 1874, to the extent of £6975.

In your leading article, however, you observe that no doubt they will be able next year to pay 12½ per cent., if the bill of the Board of Works should pass.

Now, as I am a shareholder in the company, I should be very glad to see this prognostication realized; but I cannot, I confess, come to the same conclusion as yourself.

The iniquitous bill of the Board of Works provides that any company selling gas under 3s. 9d. per 1000 feet may, for every 1d. per 1000 under that sum, divide 5s. per cent. above 10 per cent.—*i.e., provided they can earn it.*

If the South Metropolitan Company could earn 12½ per cent. at their present price of 3s. per 1000, this being 9d. below the initial price of 3s. 9d., they could, of course, divide nine times 5s., or 2¼ per cent. above 10 per cent., but if at that price they cannot earn even 10 per cent., how are they to divide more?

No doubt they can raise the price of their gas, and divide something more than 10 per cent. by so doing; but to me it appears obvious that they cannot divide 12½ per cent., as stated in your leader, especially as by the new bill they are required to supply 16-candle gas, instead of 14-candle as heretofore.

The consumers in the district will have small reason to thank the Board of Works for passing such a bill as holds out an inducement to the company to raise their price, by affording them a premium for so doing, of which they will be very foolish if they do not avail themselves, but I fear it will be long ere they can divide 12½ per cent. A Shareholder.

[Of course the 12½ per cent. dividend could not be paid if it were not earned; but our assumption was that the reduction in the cost of coal might allow the profits necessary to pay such a dividend.—Ed. J. G. L.]

STEAM STOKING APPARATUS.

Sir,—In Mr. Warren's paper on stoking machinery, reported in your impression of the 29th ult., he states that the machine patented by me "very much resembles" that of Messrs. Somerville and Robinson. This statement I beg leave to contradict, as the principle and action of the two machines in question are totally different, which any one may be assured of by consulting the respective drawings and specifications.

But, if Mr. Warren has examined my specification, he must have observed that the means of turning the scoop, by a screw affixed thereto, and "working in a fixed collar" is there described and claimed as original. How is it then that he has patented and described the same at the meeting as his invention? The most charitable inference is that Mr. Warren has not seen my specification, and that the erroneous statement was made without investigating the subject.

11, *St. Michael's Road, Stockwell, July* 10, 1875. Wm. Richards.

North British Association of Gas Managers.—The fourteenth annual meeting of this association took place at Dundee on the 9th inst., and was in all respects highly successful and interesting. there was a very large attendance of members. We hope in an early issue to find room for the papers read, and the discussions which took place thereon.

Institution of Civil Engineers.—The council have just awarded the following, among other, premiums and prizes for the session 1874-75:—A Telford medal, and a Telford premium to Harry Edward Jones, for his paper on "The Construction of Gas-Works." A Telford medal, and a Telford premium, to Alexander Richardson Binnie, for his paper on "The Nágpúr Water-Works, with Observations on the Rainfall, the Flow from the Ground, and Evaporation at Nágpúr; and on the Fluctuation of Rainfall in India and in other places." A Telford medal, and a Telford premium, to George Frederick Deacon, for his paper "On the Systems of Constant and Intermittent Water Supply, and the Prevention of Waste, with special reference to the restoration of Constant Service in Liverpool." A Telford premium to Charles Colson, for his "Details of the Working Tests and Observations on Portland Cement, made during the Construction of the Portsmouth Dockyard Extension Works." A Miller prize to James Charles Inglis, for his paper, "Experiments on Current Meters and their Bearing on the Hydraulics of Rivers." A Miller prize to William Patterson Orchard, for his paper on "Hydraulic Calculations relating to Water Pressure and Walls to resist it, Gauging of Water, the Flow of Water in Open Channels and in Pipes." A Miller prize to Joseph Tysoe, for his paper on "The Manufacture of Illuminating Gas from Coal." A Miller prize to John Charles Mackay, for his paper on "Concrete."

Parliamentary Intelligence.

HOUSE OF LORDS.

Monday, July 5, 1875.

Metropolis Gas Companies Bill.—The report of the select committee of the House of Commons, together with the proceedings of the committee and minutes of evidence, communicated pursuant to message of Thursday, July 1, was received and ordered to be printed.

Tuesday, July 6.

PUBLIC HEALTH BILL AND METROPOLIS WATER SUPPLY.

On the motion for going into committee on the Public Health Bill,

The Earl of Camperdown, according to notice, rose to call attention to the water supply of the metropolis. He thought that the ratepayers would have to pay an enormous amount of money in consequence of the action of the metropolitan water companies in connexion with the working of the statute under which the metropolis was re-valued from time to time. On each re-valuation both the gross and the rateable value of property was largely increased. That, he ventured to think, would be found to be a result of the recent re-valuation. The water companies made their charges on the rateable value of the premises; so that, with the increase of the value of property in the metropolis, those companies could bring large additional sums into their coffers without extending their works or improving either the quantity or quality of the water. They could do this until their dividends reached 10 per cent. Since the Metropolis Valuation Act of 1871 came in force those water companies had raised their capital from £9,975,000 to £11,071,000. Their plan of raising money was by the issue of additional shares, instead of by loans, which they could obtain at a moderate rate of interest. Their shares were readily taken up, because persons knew that when the time came, as come it would, when a central authority would have to purchase the rights of those companies, the purchase would have to be made at a very high rate on a very much increased revenue. It might be difficult to insert in this bill a clause to protect the ratepayers against the water companies, but he suggested that the Government might well consider whether the operation of any new valuation of the metropolis ought not to be suspended a year or two, in order that Parliament might have an opportunity of considering what ought to be done in respect of those companies.

The Duke of Richmond reminded the noble earl that he was entirely out of order, inasmuch as, by a clause in the bill, the metropolis was expressly excluded from the operation of the measure, and, therefore, it would be out of order to enter upon the discussion of a subject which was not formally under the notice of their lordships.

The House then went into committee on the bill, and clauses up to 110 were agreed to. In clause 110, prohibiting in populous districts the carrying out of certain manufactures and processes injurious to health,

The Duke of Northumberland moved an amendment, having for its object to bring within the clause the smelting or burning of ores or minerals giving off sulphurous acid, sulphuretted hydrogen, or ammoniacal gases.

The Duke of Richmond opposed the amendment.

Their lordships divided on the question that the amendment be inserted—

Contents	33
Non-contents	54
Majority	—21

The amendment was consequently lost, and the clause was added to the bill.

The remaining clauses were also agreed to, and the bill passed through committee.

Thursday, July 8.

The Slough Water and Manchester Corporation Water and Improvement Bills were read the third time, and passed.

Friday, July 9.

The Commercial Gas Bill, brought from the Commons, was read the first time, and referred to the examiners.

HOUSE OF COMMONS.

Monday, July 5, 1875.

The Commercial Gas Bill was reported.

METROPOLIS GAS COMPANIES BILL.

Sir J. Hogg asked the First Lord of the Treasury whether he could arrange the business of the House that evening so as to allow this bill to come on at an hour when discussion could take place; and if he could not do so, whether he could make such an arrangement for Thursday, the 8th inst., or some early day, that would enable the bill to be proceeded with this session.

Mr. Disraeli: It would afford me much gratification to assist the views of my honourable friend, but I really cannot make an arrangement at present, or even for the 8th of July. When the business of the Government is more advanced I may be able to make a statement that is more satisfactory.

The committee was afterwards deferred till Thursday, July 8.

Tuesday, July 6.

The South Staffordshire Water and Barrow-in-Furness Corporation (Lords) Bills were referred to a committee, consisting of Sir John St. Aubyn (chairman), Sir R. Bateson Harvey, Sir William Edmondstone, Mr. Maurice Brooks, and Mr. A. Bonham-Carter (referee); to meet on Tuesday, July 13.

Wednesday July 7.

The Barrow-in-Furness Corporation Bill (Lords) was read a second time, and committed.

Commercial Gas Bill.—On the motion of Sir Charles Forster, it was ordered—"That, in the case of the Commercial Gas Bill, Standing Orders 99, 215, 216, and 244 be suspended; and that the bill, as amended in the committee, be taken into consideration on Thursday, July 8, provided amended prints shall have been deposited by Wednesday, July 7."

Thursday, July 8.

A petition in favour of the Barrow-in-Furness Corporation Bill (Lords) was presented from inhabitant ratepayers, &c., in Yarlside.

The *locus standi* of the Corporation of Dudley as petitioners against the South Staffordshire Water Bill (Lords) has been disallowed.

Commercial Gas Bill.—The consideration of this bill, as amended, was deferred till Friday, July 9.

Metropolis Gas Companies Bill.—Petitions against this bill were presented from the Surrey Consumers Gas Company, the London Gaslight Company, and the Phœnix Gaslight and Coke Company. The committee of the whole House was deferred till Monday, July 13.

Burghs and Populous Places (Scotland) Gas Supply (No. 2) (recommitted) Bill.—The order for committee on this bill was read and discharged. Bill withdrawn.

FRIDAY, JULY 9.

WATER SUPPLY AT HUCKNALL.

Mr. MACDONALD asked the President of the Local Government Board if his attention had been directed to the report of the Hucknall Torkard Board, which appeared in the *Mansfield and North Notts Advertiser* of the 2nd inst., and in which it was reported Mr. William Calladine made the following statement:—"That 200 inhabitants of Hucknall found their supply of water from muddy streams, 250 more were dependent on wells which did not afford a sufficient supply, and 100 more on wells contaminated and impure and unfit for use; that after every storm there was a great pollution of wells from the surface drainage, and this state of matters, if it did not create disease, at least did much to propagate it and make it more malignant." And whether, if such a statement be really correct, the Local Government Board cannot compel the board to take immediate steps to supply pure water to the district.

Mr. SCLATER-BOOTH said that the case came under the notice of the Local Government Board towards the end of last year, and the local authorities were then informed by his direction that it was their duty to provide a proper water supply for their district. It appeared that shortly afterwards the neighbouring districts joined with the authorities of Hucknall with the view of providing themselves with water, and in the month of March last the combined districts instructed an eminent engineer to report on the subject. This report was laid before the authorities a month ago, and considering that the works would involve an expenditure of between £50,000 and £60,000, he did not think that any complaint on the score of undue delay could be attributed to the local authorities. If they should decline hereafter to provide any works, it would be competent for the Local Government Board, on complaint being made, to issue an order requiring them to furnish such supply; and in the event of disobedience to that order, which there was no reason to anticipate, the board would be able to apply to the Court of Queen's Bench for a *mandamus* to compel its execution.

METROPOLIS GAS COMPANIES BILL.

Petitions against this bill were presented from Surrey Consumers Gas Company; Guildford Gaslight and Coke Company; Independent Gaslight and Coke Company; Imperial Gaslight and Coke Company; John Gordon; Kingston-upon-Thames Gas Company; Lichfield Gas Company; James Famer English; Cornelius Aunsder; Edward Hoyland; William Sivete; Richard C. Griffith; John H. Glaisyer; James Adams; William Anderson; James Pope Kitchin; James Matthews; and Samuel Rosling.

Sir JAMES HOGG gave notice that on Monday, July 12, he would ask the First Lord of the Treasury whether he could enable the order of the day for the committee on the Metropolis Gas Companies Bill to come on on that evening at such an hour as would enable the House to entertain the question.

COMMERCIAL GAS COMPANY'S BILL.

On the order for the consideration of this bill,

Mr. SAMUDA remarked that it had come down from the same committee as the Metropolis Gas Companies Bill. That committee had investigated the whole of the bills, and they had come to the conclusions stated in the preamble of the bill for regulating gas companies. They had decided that the bill now under consideration was a private bill, and they had unanimously come to the conclusion that the bill should be allowed to go on. By this bill, which obtained the sanction of the committee, the company had undertaken to accept all the terms which the committee had thought advisable, in the public interest, to import into the bill. What were those terms? Those terms were, in the interest of the public, more liberal than anything that had ever been seen before in this country. They had consented to limit their charge to 3s. 9d. per 1000 feet, and to give an illuminating power of 16-candle gas; and had agreed that, whenever it becomes necessary to raise the charge higher than 3s. 9d., they would decrease the dividend 5s. per cent. On the other hand, the committee thought it reasonable, whenever, by economy or other circumstances, the company were able to reduce the charge below 3s. 9d., they should have an opportunity of charging, for every penny reduction, one-quarter per cent. additional dividend. These were the general terms in the interest of the public. Those who opposed this measure acted with very different feelings to the company he represented. Under existing legislation, the Chartered Gas Company and the Imperial Gas Company had both increased the price of their gas, and had charged the public at the rate of 5s. for every 1000 feet during the time that the company he was now representing, which, in a small degree, had entered the same district, had only been charging 3s. 9d. Throughout 20 years experience small companies, acting economically, had been able to give the public something like the terms they would now be compelled to perform. He could not see why, on a private bill like this, that affected no interest beyond the company's, any abnormal influence should be brought to bear on the House to attempt to upset the decision of the committee in the manner to which he had previously referred. He trusted they would have an opportunity of hearing from some members that he had in no shape or way misled the House or overstated the case of the company, and he trusted the House would be as unanimous as the committee in coming to the conclusion that the company ought to be supported. He would only add that, if it should unfortunately happen that this bill were not to receive the sanction of the House, this company, that had been working in all honesty, would literally be prevented supplying gas to the neighbourhood, and there would be darkness over the whole of the district the company now supplied. Wherever there was an increasing population additional money was required and additional retorts, in order to supply gas to the neighbourhood. The company had no means to extend their operations, and he thought the case was so clear he might safely leave it in the hands of the House.

Mr. STACPOOLE also expressed a hope that the House would pass the bill without further amendment.

Mr. GOLDNEY was not aware that the bill was opposed in fact, although rumours to that effect had been circulated. This bill was a private bill seeking for certain powers, and he hoped it would be accepted as a measure in the right direction. He had served on Lord Cardwell's committee of 1867, when, after a long consideration, and after receiving evidence from all parties as to the supply of gas in the metropolis, the committee came to a conclusion which at that time they were unable to carry out, but which had been adopted by the committee presided over by the right honourable gentleman the member for Bradford; and now one of the companies asked the House to be allowed to accept the terms imposed by that committee. He might not be taking up too much time of the House in stating how the case stood with regard to the supply of gas in the metropolis, and the legislation thereon. They might be told that this was only a "squabble about gas;" but the fact was that it meant the expenditure of over £3,000,000 per annum; and moreover it was a very serious expense to the poorer inhabitants who lived in close and confined districts in the metropolis. Previous to 1853 there was a large competition going on amongst the different gas companies in the metropolis as to the districts they should occupy, and the different localities they were to supply with gas, and the consequence was that in 1860 the Metropolis Gas Act was passed. Then those districts which had been merely settled amongst themselves were defined by statute, and each of the 13 companies had an area which they were to call their own, the only stipulation on behalf of the public being that the illuminating power should be equal to 12 candles, and that the price should not exceed 4s. 6d., while the dividend was not to exceed 10 per cent. In 1866 the public grew weary of paying this large sum, and the Board of Trade was appealed to with the view of increasing the illuminating power and reducing the price of gas. The result of that was the appointment of Lord Cardwell's committee, which passed resolutions to bind the companies to give a better supply and a better quality at a reduced price. The companies did not agree to that at the time, and so they had to appoint the committee presided over by Mr. Forster to consider the bill introduced by the Board of Works. The Board of Works and the City of London were doing all they could to benefit the community, both as regards the supply of gas and water. They had introduced a bill which, on the recommendation of the Board of Trade had resulted in certain conditions being imposed by the committee—viz., that the standard price be 3s. 9d., that the dividend on the new capital raised by the companies should not be the old amount of 10 per cent., but should be reduced to 7 per cent.; that they should pay 7 per cent. on one half of the additional amount required for the increased supply, and that they should also bear the expense of testing officers for the purpose of seeing that the gas was what the public were entitled to have. He would only allude to that bill which at present was not before the House; but there were two bills before the committee, one promoted by the Imperial, and the other by the Commercial. (Loud cries of "Agreed, agreed.") He begged to second the motion.

Colonel MAKINS was not aware that this bill was opposed, or that gas matters were to be discussed at that time. He was quite prepared to enter into the question, but he did not think it was the proper occasion to do so. With regard to the remarks of the honourable member for the Tower Hamlets, he wished to state that the honourable member had not correctly stated the opposition of the companies to this bill. The honourable member had told them that if they did not get the power of erecting new works, and so supplying a fresh amount of gas, their district might be darkened. Now Lord Cardwell's committee gave power to the Chartered Company to supply gas in bulk to the Commercial, or any other company; and, therefore, the dreadful catastrophe spoken to by the honourable member need not happen if the Commercial did not get their bill. He was not going to oppose the bill, because there was another place for doing that and going more fully into the matter; and it must not be assumed, because he adopted this course, that there was no answer to the bill.

Mr. W. E. FORSTER would only detain the House for a few minutes. He was glad to find that there was no opposition to the bill; but the opponents must have intended opposition. He would only say, with regard to the public bill, which was referred to the committee, that he should like to make an appeal to the Government to do their utmost to give an opportunity for that bill to be discussed. Although a measure somewhat of a private nature, yet it also affected the interests of the whole of the metropolis. The Government had hardly dealt fairly in making that bill, in a measure, a public bill, if they did not intend to proceed further with it. When the bill was first before the House, the Government gave no facilities for its being discussed at an hour when it could be properly discussed, which resulted in the appointment of the committee, which sat for 20 days, and five or six days more in discussing this private bill. There was very great expense incurred by the Board of Works and the companies in retaining counsel; the matter was carefully gone into, and he did say that, if the Government did not intend to proceed further, they ought never to have initiated those proceedings. Being a public bill, the honourable gentleman opposite had a perfect right to put an amendment that it should not be taken after half-past twelve. The Government ought to enable the promoters to have a full discussion at such a period that the half-past twelve rule would not apply. If the Government would not do so, then this important matter would remain undecided, and all the expense of counsel would come to nothing, and he did not think they would get a committee to sit on the matter again.

The SPEAKER called the right honourable gentleman's attention to the fact that the merits of the gas company's bill were not before the House.

Mr. FORSTER said he would not continue to discuss the merits of the bill, and he did not know whether he was in order in appealing to the Government to give an opportunity for discussing the merits of that bill. If this was not done it would prevent any hybrid bill being carried to a conclusion at a late period of the session. With regard to the question at present before the House, he was glad to find that there was no opposition. He could hardly suppose that it could be so, because the opponents and promoters had agreed upon the merits; and it could only be that any opposition could arise by reason of this company setting a good example which the other companies would not follow.

Colonel BERESFORD said it had been intimated that there was no opposition to this bill. The companies were quite willing to go on in their own way, and if the Commercial Company chose to attempt to work miracles, or take their chance of committing suicide, the other companies would be quite content. He trusted that the Government would watch the confiscating clause which had been sent back to the House.

Mr. YOUNG also understood that there was no opposition to the bill, but those who were taking an active part against the gas companies had no reason to find fault, for the notice of opposition had given them an opportunity of making speeches to create prejudice against the private interests of the gas companies. The honourable member for Bradford had said that the committee had sat for 20 days, but the legislation that the honourable member proposed to upset occupied five or six months inquiry to settle. (Loud cries of "Order.")

The SPEAKER rose to order, when

Mr. BIRLEY wished, as a member of the select committee, to add his expression of gratification that this bill was not to meet with opposition, and, at the same time, to appeal to the Government to give every facility for the discussion of the other bill.

The Standing Orders having been suspended, the Commercial Gas Bill was then read the third time, as amended, and passed.

SATURDAY, JULY 10.

A petition was presented from the Corporation of Hull against the Gas and Water Orders Confirmation Bill, as far as relates to Newington.

MONDAY, JULY 12.

METROPOLIS GAS COMPANIES BILL.

Sir JAMES HOGG asked the First Lord of the Treasury whether he could enable the order of the day for the committee on the Metropolis Gas Companies Bill to come on at such an hour as would enable the House to entertain the question.

Mr. DISRAELI said that he was afraid the request of his honourable and gallant friend was quite out of his power this session; but what he had to ask his honourable and gallant friend was, that he should wait until next session, and the Government would, as far as it lay in their power, place him and his friends in the same position that they occupied at present. (Laughter.) He had an announcement to make, which would be extremely advantageous to his honourable and gallant friend—viz., that it would not be necessary, so far as the Government were concerned, to refer the bill next session to a select committee. There would also be other advantages attached to the concession. That was the intention of the Government, but they could not certainly assist his honourable and gallant friend at present in advancing his measure this session. Next session, as far as the Government were concerned, the honourable member and his friends would find themselves exactly in the same position as they now occupied. (Renewed laughter.)

Sir J. HOGG thanked the right honourable gentleman for the intimation he had made.

HOUSE OF LORDS COMMITTEES.

THURSDAY, JUNE 3.

(*Before the Duke of* MARLBOROUGH, *Chairman; Earl* JERSEY, *Earl* CATHCART, *Viscount de* VESCI, *and Lord* ELGIN.)

ASHTON-UNDER-LYNE, STALYBRIDGE, AND DUKINFIELD DISTRICT WATER BILL.

Mr. SALISBURY appeared for the promoters, and Mr. POPE, Q.C., opposed, on behalf of the Mossley and Hurst Local Boards.

Mr. SALISBURY said the promoters of this bill were a joint committee, comprising representatives of the Corporations of Ashton and Stalybridge, and the Local Boards of Mossley and Hurst. He explained that by the bill it was sought to obtain additional powers in respect of the water supply of the district and gathering-ground. The petitioners alleged that no opposition was offered in the House of Commons to the measure, because an agreement was come to that certain clauses should be inserted in the bill. He was instructed that no such agreement was come to, and therefore he submitted that his learned friend had no *locus standi*, and could not be heard even upon clauses.

Mr. POPE said the Mossley and Hurst Local Boards were the local authorities of two places within the area of the Ashton and Dukinfield water supply. In 1869 the Mossley Local Board promoted a water bill of their own, but that bill was rejected on the ground that the supply proposed to be taken ought to be used for the whole district. A joint committee was then appointed in which the Mossley and Hurst Local Boards were represented, and that committee approved of the present bill. But the local boards were not bound by the decision of the joint committee. The position of the petitioners would be altered by the bill, and therefore they had a right to be heard. Certain clauses were agreed to be inserted in the interests of the petitioners, and he submitted he had a right to be present and see that those clauses were put in the bill.

Mr. SALISBURY said the promoters also represented the opponents, and therefore the petitioners were already represented.

The COMMITTEE decided the local boards had a *locus standi*.

The preamble was then formally proved.

Mr. POPE asked the committee to give the petitioners the costs of any reasonable appeal from the arbitrator's decision with reference to the transfer of the Greenfield Water-Works.

Mr. SALISBURY opposed the application, and the committee ultimately decided to grant the application of the petitioners.

The clauses of the bill were then agreed to, after some few formal amendments, and the chairman was ordered to report the bill to the House.

BRADFORD WATER AND IMPROVEMENT BILL.

Sir E. BECKETT, Q.C., Mr. CRIPPS, Q.C., and Mr. P. THOMPSON appeared for the promoters; and Mr. ASPINALL, Q.C., for Sir Henry Tufton, Bart., the only petitioner against the bill.

Mr. CRIPPS, in opening the case, said the bill had reference to many matters which he would not go into. In the House of Commons there were many opponents, but now the only opposition had reference to the water supply. In 1854 the Bradford Company, whose works were soon afterwards transferred to the corporation, was formed for the supply of water to Bradford. He explained the difference between the high level and low level services, and said that the present opposition had reference to the latter. Beyond their present supply there was no need for the corporation to get power to take more water, but there was a difficulty about the construction of reservoirs. There were few places where the population had increased more rapidly or the prosperity been greater than at Bradford. The result was that the reservoirs which a few years ago were thought to be sufficient were found very insufficient for collecting the water required. Bradford was in want of more water, and its prosperity and sanitary condition were involved in the question. In the gathering-ground there was plenty of water, but there were not sufficient reservoirs to store it. They did not went power to take more water, but leave by make reservoirs. They were opposed by the Duke of Devonshire, until he discovered that water was a paramount necessity to Bradford, and then he gave way like the other opponents. Unfortunately, they had to have recourse to the land of Sir Henry Tufton to construct a reservoir, and though there was no other place to which they could resort, the petitioner said they should not take his land. Sir Henry Tufton was in the same position as all other landowners; so soon as a great public necessity was proved, they must give way. The Lands Clauses Act gave them the option of going either before a jury or to arbitration, and they always got full compensation, the Legislature deciding that there should be a pecuniary remedy for such an injury to an estate. Turning to the petition, he contended there was nothing exceptional in the case, the petitioner's grievance being that the bill did not compel the corporation to supply water to places out of Bradford. Surely the parties out of the borough were the persons to complain. Sir Henry Tufton had an estate at Silsden, but comparatively he was a stranger there. Silsden appeared in the House of Commons, and the clause they required being put in, they did not appear again. The petitioner left them entirely in the dark as to the reason for the complaint he alleged. He stated that the water was needed for the monopoly of Bradford, but he (Mr. Cripps) hardly knew what was meant by that, because 31 places outside of Bradford were supplied with water from these works. Sir Henry Tufton seemed to suggest that because they had once taken his land he was to have an immunity for his estate from further interference. It was impossible at that time to see what the necessities of Bradford would be as regarded water. When the bargain was made, no doubt it was thought that the provision would be sufficient, but a different state of things had arisen, and must be provided for. Sir Henry Tufton complained that Silsden had become a place largely increasing in population, and requiring provision for water. Silsden was one of the petitioners in the House of Commons, and surely they, and not a stranger in the neighbourhood, were the people to look after their own interests. Silsden was supplied by Bradford with water, and as they did not appear it must be taken they were satisfied. The petitioner believed that the construction of the Cringles reservoir would prevent the building of houses and the construction of mills on account of the danger of inundation in the Silsden valley. But where were the residents and the millowners? Not once of them came there to represent the danger to which they would be more subject than Sir Henry Tufton. Such a danger was not a new one. Science had turned its attention to that danger, and took the most careful precautions to meet it. Besides there were the legal enactments, and the powers which the justices had to deal with reservoirs which were complained of as dangerous. The corporation were liable for compensation to all parties who might be damaged by the bursting of a reservoir or other portion of the works. It was an extraordinary allegation for a person to make who was merely objecting to his land being taken for the construction of reservoirs, while all those persons who were said to be threatened with danger were absent. It was stated that the danger of bursting was not a merely idle apprehension, as before the Commons committee it was admitted that some of the Bradford reservoirs were imperfectly constructed. He did not know what that referred to, but he supposed the petitioner was prepared with some evidence on the subject, as none was produced in the other House. The petitioner represented that water should be supplied to all persons at the same price. But that was a resident's question and not a question for a landowner, and besides the present system of charging was that usually adopted. The petitioner thought that the water should be taken from some other source, and that the interests of the manufacturers at Bradford had been made paramount without reference to his own interests, which was of course a matter for the consideration of the committee. The bill was a very ordinary one, and there was nothing in the position of Sir Henry Tufton which entitled him to interfere with the interests of Bradford.

The following witnesses were then called in support of the bill:—

Mr. *Brayshaw*, chairman of the Water-Works Committee of the Bradford Town Council, examined by Mr. THOMPSON, described the present high and low level services in Bradford. For the high level service several Acts had been obtained, but not one for the low level for many years. There had been scarcity of water lately in Bradford in both services. Several years the supply had been shut off for hours, and even the trains had had to stop because they could not get water. The corporation had power to supply about 30 places with water, and Silsden was one of them. There was a great dearth of water for weeks in 1873, and the corporation had to take special means to meet the difficulty. There was also a dearth last year. In July they had to issue several cautions respecting the use of water. The question was before the general committee every Friday, and a sub-committee met every morning to try to meet the necessities of the case.

The CHAIRMAN asked if there was any allegation as to there being no deficiency of water in Bradford.

Mr. ASPINALL said he had never alleged that there was not want of water for trading and domestic purposes, but the two were distinct, and he should like it to be shown there was a deficiency for domestic purposes as distinct from trading purposes.

Cross-examined by Mr. ASPINALL: On occasions when there was a deficiency they restricted water both for trade and domestic purposes at the same time. They supplied both from the same reservoir. If they had applied all the water to sanitary and domestic purposes they would have enough. Water was sold in bulk to manufacturers, and to the inhabitants by rental. More was charged to small manufacturers than to large ones. The large traders paid 4d., the small ones 1s. per 1000 gallons. Irrespective of the clause which Silsden got, they had not been compelled to supply the out-townships with water. They sold it in bulk in the same way as for manufacturing purposes. Silsden belonged to Sir H. Tufton almost entirely, and was a growing place. They got water at 6d. per 1000 gallons, their bill being last year about £60. He understood that Silsden was to have water the same number of hours as Bradford. He did not know that it was a poor place, and had been almost sold up to pay the costs of opposing this bill in the House of Commons. They came to oppose their own interests, and having found it out had now withdrawn.

By the CHAIRMAN: It had been the practice to supply Silsden the same number of hours as Bradford, and it was intended that they, as well as every one else, should continue to be so supplied.

Re-examined by Mr. THOMPSON: The water for manufacturing purposes was restricted on the 15th of July, that for the domestic service not until the 24th, 1874. If the mills had been deprived of water they would have stopped, and the hands have been thrown out of employment. They were not compelled to supply the out-townships, but they had never refused to supply when they asked for it. In case of drought they treated the out-townships exactly as they treated Bradford. In every case the out-townships had tanks, and if Silsden did not have them it was not because Bradford prevented them.

Mr. *Margerison*, said his works depended entirely upon the Bradford water. They used about 12 million gallons per quarter. His mills were closed, and the men thrown out of employment for days and half days last summer, owing to the want of water. They were restricted for more than a fortnight, and in a place like Bradford water was everything in the carrying on of manufactures.

Mr. *Thornton*, locomotive superintendent of the Lancashire and Yorkshire Railway, stated that last year the water began to fail in June, and they had only had about one-sixth of their supply at the end of July. Sometimes they had as many as thirty engines standing idle for want of washing out. The goods traffic had to be sacrificed in order to carry on the passenger traffic. It caused serious loss, and great inconvenience to the company. The engines were running about for water, and went as far as Mirfield and Halifax for it.

Mr. *Willis*, brassfounder and owner of yarn-mills, was also called to proved the great scarcity of water. He said that when the supply was cut off for manufacturing purposes the water was also restricted for domestic purposes, and there was almost a riot in consequence. He had to employ horses and carts to carry water, and spent nearly £20 a day. The mill tenants claimed damages, and refused to pay rent. There was an arbitration, and the loss fell upon the tenants.

Mr. *Butterfield*, medical officer of health for Bradford, said he noticed the deficiency of water in both high and low level services in the summer months. He attributed the spread of zymotic diseases to deposits in the drains and sewers in consequence of there not being sufficient water to flush them because of the small rainfall. If there had been more water the drains would have been properly flushed. In case of deficiency of water during the summer months disease was sure to be increased.

Mr. *Gott*, borough engineer, examined by Sir E. BECKETT, said that there had been a great increase of the population in Bradford and the necessity of a further supply of water was imperative. There had only been one year, 1872, in which they had been able to give a full supply. The manufacturing and domestic supplies went through the same service, and it was impossible to limit one without limiting the other. It was not practicable to go on without a much larger supply of water. The corporation had power to take all the water from the area shown on the plans, so that no new power was being asked for taking water. Excepting so far as there was danger to any reservoir in the world, there was no danger from the proposed reservoir on Sir H. Tufton's estate. There had been great difficulty in constructing some of the reservoirs, and at times there had been danger; but it had been seen, and so long as there was any, the reservoirs were not filled. He never heard of the people of Silsden being warned to leave their houses at a moment's notice, because there were fears of the reservoir bursting.

FRIDAY, JUNE 4.

Mr. *Gott* recalled, and cross-examined by Mr. ASPINALL, said that no reservoir had been constructed on Sir H. Tufton's property for the supply of water to Bradford. They were compensation reservoirs for the purpose of giving water to the millowners. Barden reservoir was used for the first time in 1874. There was no danger from the reservoir at Silsden. It was difficult to say that danger had not been apprehended from some of the reservoirs. Some person might have apprehended danger. There had been great difficulties in the construction of the Bradford reservoirs, but the difficulty was seen, and until they were filled with water there could have been no danger. The total supply to Bradford was 7,300,000 gallons per day, and about 3,000,000 gallons of that were used for trade purposes. About 6½ millions were supplied by the low level system, 4,300,000 gallons were used for domestic purposes. There was no clean water used for flushing the sewers. The water used for the streets was classed as water for public purposes. There was no special reserve for extinguishing fires, the mains being always charged with water at full pressure. The height of the Holden reservoir embankment would be 140 feet in the middle, and the water would be only 60 feet deep. He did not know that the embankment would be the highest in England, but he did know there were many in which the water was as deep. The highest embankment they had at Bradford was that at Horton Bank Top reservoir, which was 130 feet, and held 200 million gallons. The Barden reservoir would hold 400 million gallons. The conduits on Sir H. Tufton's estate took all the streams which they would take into the Cringles reservoir. Silsden reservoir was made to give compensation water, but the corporation could give it by any means to the extent provided by the Act of 1854. That compensation water was given to all persons interested, and not only to millowners. [Mr. Aspinall read the 104th clause, showing that it only had relation to millowners.] Witness's

notion was that they had power to take the water from the whole of the drainage area, although the works for which they had powers to construct would not hold it all, and then the surplus water ran to waste down the river. The whole of the compensation water, and in the wet season the flood water, ran through Silsden. If the surplus water were taken into the new reservoir, that would diminish the water running through Silsden. No one would think of constructing works merely for the purpose of collecting waters during an occasional flood. He did not know that there was any one concerned in the arrangement of 1854. It was agreed that the conduit should be taken through Sir H. Tufton's estate by way-leave.

Re-examined by Sir E. BECKETT: All the water of the streams now ran either into the conduit or into the Silsden reservoir. If Sir H. Tufton attempted to take or divert any of the water he would be liable to a penalty under the Act of 1854. If they chose to take all the water into the Silsden reservoir, and gave more compensation water to the people below, Sir H. Tufton could not prevent them. Practically, therefore, they were masters of all the water in those streams.

Mr. *Binnie*, water engineer for the Bradford Corporation, was placed in the box, when

Sir E. BECKETT said that during the whole of the hearing that morning efforts had been in progress to settle the case, and it was no use wasting time by sham witnesses, when it was only for the purpose of keeping the case before the committee, pending the result of the negotiations. It was subsequently announced that the matter had been arranged by the opposition of Sir H. Tufton being withdrawn, and the clauses having been agreed to, the bill was ordered to be reported to the House. The terms of the arrangement were dealt with in a long agreement, by which the Corporation of Bradford obtain the right of purchase, should they require them, of 200 acres of land, for the construction of two reservoirs, one covering 100 acres, and one rather less. For this the sum of £26,000 is to be paid, which is to include all costs of land severance and compensation of every description. The price is somewhat below the average price paid for the land in 1854.

WEDNESDAY, JUNE 16.

(*Before* Earl DEVON, *Chairman*; *Earl* NELSON, *Viscount* HUTCHINSON, *Lord* CARYSFORT, *and Lord* CLONCURRY.)

CHELSEA WATER BILL.

Sir E. BECKETT, Q.C., and Mr. ASPINALL, Q.C., appeared for the promoters; Mr. HILYARD and Mr. MULLIGAN, for inhabitants of Moulsey, who petitioned against the bill.

Sir E. BECKETT, in explaining the object of the bill, said it was to enable the Chelsea Water Company to remove their intake from a place called Seething Wells, near Surbiton, to a point near Sunbury. This was rendered necessary because the present intake was below the junction of the Mole with the Thames, and in times of flood the Mole brought down a great quantity of mud, which made the water thick and entirely unfit for consumption. Even as far back as the years 1851-2 there was a long inquiry before a committee of the House of Commons as to what ought to be done with regard to the London water-works, most of which were then taking their water from below Teddington Lock. The result was that an Act was passed requiring them all, within a specified time, to remove their intakes above that lock, and no notice was at that time taken of the peculiarity of the Mole. By the same Act, and a later one in 1865, all the water companies taking water from the Thames were compelled to pay the Conservators of the Thames sums amounting to a minimum of £1300 a year for keeping the river clean. All the companies were entitled to take 20 million gallons a day from the Thames. A petition had been presented against the bill from the inhabitants of Moulsey, and one of the many absurdities contained in it was a suggestion that the Thames water was unfit for London drink. It was undoubtedly unfit before 1852, when it was taken from within the tidal influence, and probably it would still be unfit, were it not that the conservators possessed the power of prohibiting towns above London from sending their sewage into it. In 1869, however, there was a special inquiry before the Duke of Richmond's committee into the quality of the Thames water. Some very large schemes were at that time projected for supplying London, one being to bring the water from Bala Lake, in Wales, and another to utilize the Cumberland Lakes for the same purpose; but the commission dismissed all these schemes as unnecessary, and adopted the evidence of those who were in favour of Thames water. Even Dr. Frankland, who was a kind of purist in these matters, said then that the Thames at Hampton was better adapted for domestic purposes than at any other part of its course. One of the conditions imposed on the companies in 1852 was perfect filtration, and by going up above Hampton, the Chelsea Company would be able to have a system of complete filtration. Two or three years ago they tried to get a bill through Parliament for doing substantially the same thing that they now proposed; but the project encountered the opposition of the late Lord St. Leonards, and the bill was thrown out on the second reading. The company had now practically succeeded in acquiring other land on which they proposed to make a reservoir. The money power of the bill, including borrowing powers, was £200,000. The petition against the bill was a most extraordinary one. The proper body to represent consumers of water was one of the local boards; but in this case all the local boards were satisfied, and out of the 210,000 consumers of the Chelsea Company's water, those who opposed the bill numbered only 182 in the first instance, and these had already diminished to 140. The majority of these were small consumers, who were not at all likely to take up such a petition on their own account, and it was manifest that it was the petition of a person who thought he could make a good thing out of it.

The following evidence was then called:—

Mr. *Bateman*, examined by Mr. ASPINALL.

I know the Thames at the point at which the Chelsea Company take their water, and it is discoloured at certain seasons of the year by the Mole, in addition to that which is due to the river itself. The discolouration of the Mole is caused by the district it flows through, Wealden clay, and clay discolouration is most difficult to get rid of by filtration. Two years ago the company were desirous of taking water from above the Mole, and brought in a bill with that object, but were defeated on the second reading. It is now proposed to go immediately above the works of the Lambeth Company, and to take the water into two subsiding reservoirs, which will hold about 140 million gallons. The quantity now supplied is between 8 million and 9 million gallons per day, so that the reservoirs will hold 16 days supply. I should prefer four reservoirs, of four days each, so that each would have 12 days rest before the water would be drawn to the filters, which will be at Seething Wells. I have examined the plans and estimates, and approved of them. The ground to be taken is very suitable for the purpose, consisting of a superficial layer of gravel resting on London clay. The gravel excavated for the formation of the reservoir will form the best material for making embankments. The reservoirs will be 20 feet from the top of the bank to the bottom. There will be no residential injury of any kind. The pipes to the filters run along the public road. There is nothing in the bill to empower the companies to increase their rates.

Cross-examined by Mr. HILYARD: I have no doubt that the water from the proposed works will be better than is at present supplied.

Major *Bolton*, examined by Sir E. BECKETT.

I am a water examiner to the Local Government Board, and report monthly on the Thames Water. I have often had to refer to the bad state of the water at Seething Wells. Above Hampton it is invariably clearer. I attribute the turbidity at Seething Wells to the outflow of the tributary streams below Hampton. In 1873 I was appointed by the Board of Trade to make a special examination into the frequent complaints against the Chelsea Company's water. The result of my inspection was that the Board of Trade recommended the company to take their water higher up, above the outflow of the Mole, to extend their filter-beds, and to provide suitable subsiding reservoirs near the site of the proposed intake. The company brought in a bill for that purpose, but it was thrown out. Since the Lambeth Company removed to above Hampton, there has been a marked improvement in the quality of their water, and when the works are entirely completed, the improvement will, no doubt, be still greater. The Mole water has the appearance of pea-soup. It cannot be properly filtered, as it chokes the filters.

Dr. *Radcliffe*, examined by Sir E. BECKETT.

I am inspector of the Medical Department of the Local Government Board. In 1869 I was directed by the Privy Council to inquire into the state of the Lambeth Water Company's water, and incidentally to that I had to ascertain the state of the Chelsea Company's water. The intakes of both companies were then close together. I recommended that they should be removed higher up, and that additional filtration should be provided. The Lambeth Company have not yet completed their works. The water was not then fit for domestic purposes. The making of subsiding reservoirs is of great consequence.

Cross-examined by Mr. HILYARD: I think the Thames water is pure and wholesome for domestic purposes. Analysis shows that the water of the Thames above Moulsey Lock is the purest of its whole course. In the ordinary condition of the river, I do not think the supply from any of the Thames companies has a tendency to produce epidemics. The West Middlesex Company take their water from above Moulsey Lock. That company is distinguished for the very large amount of provision made for subsidence and filtration. The proposed scheme would enable the Chelsea Company to do what the West Middlesex have done.

Dr. *Letheby*, examined by Sir E. BECKETT.

I was for 20 years medical officer and public analyst for the City of London. I have had to examine the Thames water supply monthly for many years. The Mole is one of the dirtiest rivers flowing into the Thames, and during flood time it is constantly charged with clayey matter, which it is very difficult to get rid of. I question whether any reasonable amount of subsidence would make it clear. Above the Mole the subsidence would be far more effective. When the water taken from the proposed site is properly treated it becomes very excellent water, as shown in the case of the West Middlesex, whose intake is just opposite that proposed in this scheme. Taking the whole year 1874, the average quantity of solid matter in the water going into the West Middlesex works from the Thames was 17·83 grains per gallon. When delivered at my house, after subsidence and filtration, the average was 16·86 grains. The ammonia was ·002 per gallon as it passed into the works, and not a trace of it appeared in the water in my house. The organic matter in the water going into the works was ·78 grain per gallon; as delivered, ·31 grain. The hardness was 14·3 originally, and as I received it 13·6; so that there was a notable improvement in the appearance and composition of the water. When the water is boiled for a quarter of an hour the hardness is, at the works, 3·6; at my house, 3·3.

The CHAIRMAN: Can you supply us with an analysis of the Chelsea Company's water at their present intake, and as supplied to a consumer?

Witness: During the whole of 1874 the water of the Chelsea Company was more or less turbid as delivered to the public, and it was very turbid on five different occasions. The action of the atmosphere upon a large surface of water in a reservoir, has a tendency to purify it. The result of the inquiries by Parliament and by Royal Commission was, that there was no evidence in any way whatever of the Thames water at Hampton being contaminated by sewage.

Cross-examined by Mr. MULLIGAN: I have ascertained the quantity of solid matter in the Chelsea water as delivered, but I do not know what it is when it goes into the works. During 1874 the average was 18·43 grains per gallon. Thames water errs a little on the side of hardness, but we do not call it a hard water. The hardness of the Chelsea water during 1874 was 14·4 grains. The Mole water is harder than the Thames water, but I cannot give you the figures. I cannot say whether the Mole contains a less quantity of organic matter than the Thames.

By the CHAIRMAN: The organic matter in the Chelsea water is ·536 grain per gallon, and the ammonia ·002, the West Middlesex having no ammonia.

Re-examined by Sir E. BECKETT: At present the Chelsea Company have not room for proper subsiding reservoirs. The Chelsea water when delivered is inferior to the West Middlesex when it enters the works.

Mr. *Taylor*, examined by Sir E. BECKETT.

I am engineer to the Lambeth Water Company. In 1871 we got an Act authorizing us to go to Hampton. Previous to that we had been troubled with the turbidity of the Mole, which caused complaints both from customers and officials. Our filters were not extensive enough to deal with it; but even if they had been, I do not think the water could have been made clear. What was wanted was subsidence, and therefore it was absolutely necessary to go higher up. When we began to take from above the Mole, we immediately found an improvement in the water. Our works are not yet completed. The wash of the water, on account of the large size of the reservoir, was so great that we have been obliged to pave the slopes.

By the CHAIRMAN: The filter water reservoirs are all covered. The subsiding reservoirs are nearly 40 acres in extent.

Cross-examined by Mr. HILYARD: We have a very large quantity of water beyond our requirements, but we are not in a condition to supply the Chelsea Company, because that would necessitate rather extensive alterations. We can get twice as much water from our present source as we require, which would be enough to supply the Chelsea Company.

By the COMMITTEE: Our summer supply is 15 million gallons per day, our winter supply about 12 million gallons. We are limited by the Thames Conservancy to 20 millions gallons per day.

Mr. HILYARD: What would be the expense of altering your works so as to supply the Chelsea Water Company temporarily?

Witness: About £2000.

Mr. *Simpson*, engineer to the Chelsea Company, pointed out the area of supply of that company. He said their supply was increasing about 200,000 or 300,000 gallons a year. The company had power to take 20 million gallons a day. Their present consumption was from 9 million to 10 million gallons a day.

This concluded the evidence in favour of the bill.

Mr. HILYARD, on behalf of the petitioners, said their reason for opposing the bill was that they considered the proposed powers were unnecessary, and would result in laying a very heavy burden upon the inhabitants, without securing a purer supply. There could be no doubt the petition would have been signed by a much greater number of consumers if the company had not intimidated and threatened those who had already signed, so that several had withdrawn their names from the petition for fear of increased charges being levied upon them. Such proceedings on the part of the company constituted a gross contempt of Parliament. This accounted for the small number of signatures, for among the inhabitants there was but one opinion—namely, that the Thames water was wholly unfit for human use. Sir E. Beckett had said the petition was evidently that of some gentleman who had a pet scheme of his own in his pocket, but he (Mr. Hilyard) was instructed to repudiate that statement as wholly unjust and unfounded.

The following evidence was then called in support of the petition:—

Mr. *J. Jones*, examined by Mr. HILYARD.

I am solicitor for the petitioners. The petition is one of the inhabitants who have signed it, without any object personal to myself.

Mr. HILYARD: Could that petition have obtained the signature of the majority of the inhabitants, if certain threats had not been used to prevent them from signing?

Sir E. BECKETT objected to such a question being put.

The CHAIRMAN said it was unnecessary to follow up that line of examination, as the committee would look at the matter solely upon its merits.

Dr. *Frankland*, examined by Mr. MULLIGAN.

I consider that the proposed scheme would enable the Chelsea Company to supply water in a less turbid condition—perhaps perfectly clear—to the consumers, but the chemical quality of the water would be only very slightly improved. I have made comparative analyses of the waters of the Mole and the Thames, and I find that after filtration the Mole water is decidedly better than the Thames water; but in flood times the Mole water contains a quantity of clay and other suspended matter, which it is very difficult to remove by filtration, and consequently, for the purposes of a water company, the Thames water is superior to that of the Mole. If it could be sufficiently filtered I should prefer the Mole water for domestic purposes. I should prefer filtered water from the present works to filtered water from the proposed new works. The Thames contains more organic matter than the Mole, and that organic matter cannot be removed by any process of filtration or subsidence possible to a water company. These organic elements are far more dangerous to health than the inorganic elements in the Mole. Of course you cannot make an experiment in such a case, but I think there cannot be a doubt that water impregnated with organic discharges is very destructive to human life. Even filtered water, which has been previously contaminated by the discharges of patients suffering from such epidemics as cholera and typhoid fever is not safe for domestic use, no matter how much it is filtered. The proposed change would give a clearer water, but it is very questionable whether the improvement would be very great.

Cross-examined by Sir E. BECKETT: Water for the supply of London should be taken from springs and deep wells before it is mixed with the sewage of the inhabitants. During last winter the Chelsea Company were obliged to deliver unfiltered, or imperfectly filtered water, containing particles of half-digested meat fibres, while the Lambeth Company at the same time were supplying a comparatively pure water. The Lambeth Company have nearly twice as much water as they require, and they could supply the Chelsea Company. It would cost the Chelsea Company much less to take their water from the Lambeth Company, than to have works of their own above the Mole. I think the Mole would amply supply all the water delivered by the Lambeth and Chelsea Companies in summer. I am not aware that the Mole is a very insignificant stream in very dry weather. If this bill is rejected, the Chelsea Company have very effective filters upon their present works, which are constructed in a better manner, perhaps, than those of any other company bringing water to the metropolis, and in ordinary seasons they could efficiently filter water from their present source. Only in flood seasons, when the Mole comes down turbid, would it be necessary for them to take a supply from the Lambeth Company. I do not think that would be the time when the Lambeth Company would themselves be most in want. It is very undesirable to spend any more money in getting Thames water; and if the difficulty can be evaded for a year or two, the people may have time to consider the question.

Sir E. BECKETT: Have you had any converts to your opinion since the Duke of Richmond's commission?

Witness: I believe it is the general opinion of scientific men.

Dr. *Alfred Hill*, examined by Mr. MULLIGAN.

I am public officer of health for Birmingham. I agree with the evidence given by Dr. Frankland. It is my opinion that water supplied from an impure source retains disease even after filteration. I do not think the proposed supply would be any purer than the present.

Cross-examined by Sir E. BECKETT: There is ammonia in the present supply.

Sir E. BECKETT: Do you think you could find any human being who would be as much inclined to drink the water as it is, as the water as it will be?

Witness: No doubt the hard water looks the more preferable to an ordinary drinker.

Sir E. BECKETT: We will take an extraordinary person.

Witness: A chemist would, I think, prefer the muddy water if it was chemically pure.

By the COMMITTEE: It has been found that extensive dilution will not deprive the living germs of their communicability.

Dr. *Frankland* was recalled, and, in answer to the chairman, said: I have the results of two analyses, one of water taken from the Mole, close to its junction with the Thames, on Jan. 31, 1873, and the other of water taken from the Thames at a point near that to which the Chelsea Company is seeking to go. The Mole water contained on that occasion ·236 of organic carbon in 100,000 parts of water, and ·042 of organic nitrogen. The hardness was 16·9°. The Thames water, on the same day, gave of organic carbon ·285, and of organic nitrogen ·05. Consequently, the organic contamination of the Thames is greater than that of the Mole. The hardness of the Thames water was 23·63° —very considerably greater than that of the Mole.

Cross-examined by Sir E. BECKETT: By Dr. Letheby's scale that 23·63° would be 16·5 grains. The difference between the organic matter in the Mole and in the Thames is not very great, but minute quantities of organic matter make a great difference.

The CHAIRMAN inquired whether the company were subject to any limitation as to the rate of charge, and as to how they proposed to pay the dividends on the money which they sought power to raise?

Sir E. BECKETT said the company would do that as well as they could. The London water companies had suffered very seriously in consequence of the requirements of the Act of 1852, and they would have to suffer more, he was afraid, by the legislation of 1871. There was no power given in the bill to raise higher rates.

Mr. *Gill*, the secretary to the company, stated, in answer to the chairman, that the present rates ranged from 20 to 30 per cent. below the maximum. The company had been obliged to raise those rates lately in consequence of the expenditure of a large sum of money on the acquisition of land.

Sir E. BECKETT then summed up the case on behalf of the promoters. He said it appeared to him that the only ground of objection to this bill by the petitioners was Dr. Frankland's theory. That theory had been considered by most competent persons, and there had never been the slightest proof of its truth to the satisfaction of anybody that had inquired into it. No doubt it was a difficult thing to prove one way or the other, but Dr. Frankland had not succeeded in convincing any one who had not made up his mind before. The question had even ceased to be in debate. When the outbreak of cholera took place in 1867 it was in debate in some degree, and Dr. Frankland and his friends had kept it an open point until the Duke of Richmond's commission. That commission was a large one, and its conclusions had always been accepted before parliamentary committees as decisive, and there was even less reason for doubting those conclusions now than there was a few years ago. He did not know what more could be said against a scientific theory than that a man of the great ability of Dr. Frankland had not been able to make any celebrated convert during all the years that he had been preaching it. His doctrine was that no quantity of sewage, however small, was ever practically got rid of by any amount of admixture of water. Merely to state such a proposition seemed to answer it, because if it were true it would be just as dangerous to drink a glass of ordinary domestic water as a cup of sewage. The world must be carried on according to ordinary probability, and not according to improved theories. Would the people of London, represented by the Metropolitan Board or by Parliament, ever think of spending £10,000,000 or £12,000,000 to go to new sources of supply because Dr. Frankland thought they ought to, even if it could be proved that once in ten years a man died of cholera through drinking Thames water? The whole matter was not to be decided by the opinions of chemists, but by the opinions of the people who wanted the water; and were the views of 140 people out of 210,000 to override those of all the rest? Mr. Jones had evidently got some foolish client who had money to spend, and had gone round with his clerks telling the consumers all sorts of things about increase of rates, and so on, and thus induced them to sign the petition; but practically the petition merely expressed the opinion of one or two people who instructed Mr. Jones. Even if the rates were raised, it would be for the benefit of the consumer. The Local Government Board had said what the company ought to do, but the company were not able to do it unless they had subsiding reservoirs, which they could not have at Thames Ditton, where they were built in. If the bill was rejected, they would go on supplying muddy water, and no one would be entitled to complain about it, for they had now done all in their power to get rid of the mud.

After a short consultation, the committee passed the preamble of the bill, and proceeded to consider the clauses.

The bill was then ordered to be reported.

HOUSE OF COMMONS COMMITTEE.

THURSDAY, JUNE 17.

(*Before the Right Hon.* W. E. FORSTER, *Chairman*; *Mr.* S. B. BRISTOWE, *Mr.* J. G. TALBOT, *Mr.* T. BRASSEY, *and Mr.* H. BIRLEY.)

METROPOLIS GAS COMPANIES BILL.

(*Continued from page* 23.)

Mr. *Edward Horner*, examined by Mr. RICHARDS.

I have been a director of the Phœnix Gas Company for 25 years, out of which I have been deputy-chairman for 14 years, and chairman for seven years. The Phœnix Company is one of the companies now remaining under the Act of 1860. We have no bill before Parliament, and therefore our company is one of those which come within the terms of Mr. Cardwell's axiom, that no company shall have the terms, upon which their capital has been raised, altered without their consent, in the absence of any competing bill. I most strongly object to the sliding scale proposed by the present bill; and I conceive that the Act of 1860 has operated well, not only for the companies but also for the consumers. We have had very few complaints in our district during the last 15 years. The dividend we pay is 10 per cent. upon the old capital of £540,000, and 7½ per cent. upon £360,000, which was authorized in 1864. At that time we also received permission to capitalize a sum of £144,000 at 5 per cent., which had been expended on plant. My first and principal objection to the up-and-down sliding scale is that it proposes an absolute breach of the contract which Parliament made with us. In 1860 we were authorized to receive a 10 per cent. dividend upon our capital, and that was confirmed by our Act of 1864; but on the new capital authorized that year we were limited to 7½ per cent.

The CHAIRMAN: What is the clause in the Act of 1860 which you consider would be broken by the sliding scale?

Witness: I have not looked through the Act for it, but I conclude that the Gas-Works Clauses Act, 1847, must have been incorporated with that Act.

Mr. RICHARDS: Clause 2 embodies the Gas-Works Clauses Act.

Examination resumed: The 40th section of the Act of 1860 limits the price we can charge, without consulting anybody, to 4s. 6d.; and if we find that there has been an increase in the cost of manufacture, or any other circumstance affecting us, warranting such an advance, we can charge up to 5s. 6d., subject to the local authority or other persons dissenting, and pursuing the course pointed out in that clause. I most certainly consider a bill which starts with an initial price of 3s. 9d. and a proposed sliding up and down scale a departure from the bargain, which gives us the liberty of charging 4s. 6d. and 5s. 6d. under certain contingencies. Under section 30 of the Gas-Works Clauses Act, we can, upon our original capital, divide 10 per cent. I believe that in our original Act there was no limit to the dividend, but we gave up that privilege for the bargain of 1860. When we have earned and distributed the 10 per cent. and the 7½ per cent., and find that there is a balance of profit and loss remaining over, we are at liberty to create a reserve-fund amounting to 1-10th of the nominal capital of the company; and when that amount was reached we were liable to an inquiry under the Gas-Works Clauses Act, and might be open to make a reduction in the price of gas. We originally had the power of making up back dividends out of the reserve-fund, from the very incorporation of the company; but when the Act of 1860 was passed, that power was limited to six years. The present price of our gas is 4s. Prior to 1860 we were charging 5s. in the country district, and 4s. 6d in the London district. From 1860 to 1865 the prices were 4s. 9d. and 4s. 3d.; but in the latter year we reduced those prices to 4s. 3d. and 4s. At that time our rural district was getting more populated, and the distinction was not so great between the two. In 1870 there was a further reduction to 4s. and 3s. 9d.; and then on the 1st of January, 1874, we rose to 4s. 6d., but reduced our price again on the 1st of July to 4s. 2d., because, the coal market having fallen, we saw our way to make the reduction. Finally, from the 1st of April, 1875, our price became 4s. In 1851, the dividend was 3½ per cent.; in 1852 and 1853, 3½ per cent.; in 1854, 4 per cent.; in 1855, 4½ per cent.; in 1856, 6 per cent.; in 1857, 6½ per cent., in 1858, 7½ per cent.; in 1859, 8 per cent.; in 1860, 8½ per cent.; in 1861, 9½ per cent.; in 1862, 10 per cent., with arrears for 1856; in 1863, 10 per cent., with arrears for 1857; in 1868, 10 per cent., and 1½ per cent. arrears for 1858; in 1865, it was 10 per cent., 7½ per cent., and 5 per cent.; and since that time we have continued to pay the full rate of dividend upon our several capitals. It may, therefore, be taken that, under the operation of the Act of 1860, our company has been extremely prosperous, and we have, on the other hand, given satisfaction to our customers. At the time we raised our price to 4s. 6d., we did not find any great dissatisfaction in the district; everybody knew what the price of coal was, and expected to pay more. We now charge a uniform price all over our district, which is filling up to some extent. At the end of 1873 our reserve-fund was £16,120, but, in addition to that, we had an undivided balance, which has since been invested, and has increased that fund to £49,282 7s. 9d.; there is also a depreciation-fund against leakage of £19,951 12s. 3d. We had the right by law to fill our reserve-fund before we made any reduction in price; and we have, therefore, so far behaved liberally towards our customers. We have three manufacturing stations—at Vauxhall, Bankside, and Greenwich. The accounts of the London stations are kept separate from the Greenwich stations, and there is a constant rivalry as to which can do the best. The accounts of the several stations are carefully examined every week; and we also examine, half year by half year, our accounts, and those of other companies. We have one engineer for the London district and another for the Greenwich district. Under the Act of 1860 the local authorities had power to appoint a chemist to test our gas, and they did so for a time, but they have given it up. Dr. Letheby is retained by the board to test the gas, so that the directors shall have a full check upon the engineers. The districting, as it is called, took place on the south of the Thames earlier than it did on the north; it was commenced in 1853 or 1854, I believe. Before the districting there were three companies supplying gas in our district entirely, and one partially. That districting has led, in my judgment, to very great economy. Prior to that period our unaccounted-for gas was

above 30 per cent., but we have now reduced it to under 7 per cent. Under the Act of 1860 our illuminating power was fixed at 12 candles, but by Dr. Letheby's returns we give 14 candles, which is equal to 15½ to 16 candles. I believe Mr. Heisch, who tests for the public bodies in the Greenwich district, could show that we give that illuminating power. We use, on the average, about 3 per cent. of cannel; it is from 2 to 5 per cent., according to the quality of coal used. Many causes will make the same coal vary in quality from time to time. Mr. Woodall is our engineer, and he has instructions to carry on the works with every possible economy. No work of any large character is ever done without the authorization and inspection of the committee of directors. We dispose of a great deal of coke at the works, but we also send a great deal in barges to the cement makers, and so on; the local consumption is not sufficient to carry off all we make. We are well situated for sending our coke off by water, all our stations being by the side of the river. We obtain the best price we can for our coke, our principle being, if possible, never to keep any stock at all. The coke sent to the cement makers is previously sold to them by contract, which method we find enables us to get a better market for the balance, which is called the yard trade. We do not send about the town in carts except for specific orders, because anything like a locomotive trade the coke dealers set themselves very much against, as they consider it a matter of competition with them. In 1873 we endeavoured to obtain the same price as the South Metropolitan Company. We advertised in all the papers for six months, and we put boards at the different railway stations, and gave every publicity we could; but the effect was that we stacked an enormous quantity, and were obliged to sell it afterwards at less money, showing that we had used the best endeavours to make what we could of our residual, and had failed entirely. We generally buy our coals by public tender, and our engineer is a man experienced in the matter of coals; but, in addition to that, we have an experimental apparatus in the works, and no new coal is bought unless it is previously tried. We have a complete gas-work in order to try every coal brought before us. The illuminating power, the amount of gas per ton, and the quality of tar, coke, and breeze, are all carefully ascertained and registered, so that at any time, when the coal is presented a second time, we turn to our analyses and we know what the coal is worth, so far as its products go. We buy our coal direct from the collieries; never from an agent if we can possibly avoid it. By advertising for tenders we do not always get the coal offered at the lowest possible price. We put out some tenders in the spring of this year, and they were all so much higher than what we expected, that we declined all except one, and we have since bought without public advertisement. In 1860 the gross price per ton of coal was 15s. 5¾d.; in 1861, 16s. 1d.; in 1862, 15s. 3¾d.; in 1863, 15s. 1d.; in 1864, 14s. 10d.; in 1865, 15s. 3d.; in 1866, 15s. 9¼d.; in 1867, 15s. 9¼d.; in 1868, 15s.; in 1869, 14s. 2¼d.; in 1870, 13s. 9d.; in 1871, 14s. 2¾d.; in 1872, 16s. 4d.; in 1873, 22s. 2¼d.; in 1874, 23s. 4¼d.; and against these prices is the amount received for residuals. In February, 1870, we entered into a long contract for a supply of nearly 350,000 tons of coal, to run through three years, and the contractors fulfilled their contract. That enabled us up to February, 1873, to obtain our coals at considerably less than the then current market price, the public received the benefit by our not having to raise the price of gas. As men of business, coal being extra cheap, we thought it the right time to secure a good supply, although we do not habitually make long contracts. While coals have been high we have made shorter contracts in the hope that they would go down. During the time that contract was running, the average price we received for our coke was 8s., leaving a loss of 6s. as between a ton of coals and a chaldron of coke. Our ammoniacal liquor and tar we put up to public tender. I am aware that the price of tar has increased, but unfortunately our contract was made when the price was low; it will run out in the early part of next year. We have as a rule economized in our capital outlay to the utmost of our power. We never call up any capital until we have erected the works. At this very time we are erecting a gasholder and laying about 1000 tons of mains, which will be all erected and finished before we call upon our proprietors to pay any money; so that we have no capital which is not productive. I conceive we have well fulfilled the obligations imposed upon us, and that we have given general satisfaction, and I protest against any alteration in that legislation as far as we are concerned.

Cross-examined by Mr. CRIPPS: Our district runs for some distance parallel with the South Metropolitan, the road leading from the "Elephant and Castle" to Camberwell Park dividing the two, the Phœnix supplying one side and the South Metropolitan the other. When the districting took place, it was laid down as an axiom that every company should have its district nearest to its works for economy, and that was carried out. Our price being 4s., and the South Metropolitan 3s., it follows that the tradesmen on one side of a street are paying 1s. per 1000 more than those on the other. I assume we are entitled to 10 per cent. upon all our old capital. We accepted certain limitations, and took a limitation of dividend in consideration, and we consider we are entitled to it so long as we fulfil our engagements. No company that I am aware of, under the Act of 1860, have ever charged more than 4s. 6d. since that Act was passed. I do not suggest that all the companies under the Act of 1868 should go back and be put under the Act of 1860, but I think that Act of 1860 is as perfect an Act as any which has been passed since.

Mr. CRIPPS: The essential difference between the two is this, that under the Act of 1868 and the Acts following it, the companies cannot exceed the 3s. 9d. price without coming for revision; under the Act of 1860 they could exceed the 3s. 9d. price, and go up to 4s. 6d.?

Witness: Yes; but I think the Act of 1860 proves itself a better Act, inasmuch as the companies under the Act of 1860 have not charged as much for the gas as those under the Acts of 1868 and 1869. If the Chartered Company had been under the Act of 1860, they never could have charged 5s.; they must have remained at 4s. 6d.; therefore I think the Act 1860 was a much better Act than the Acts of 1868 or 1869.

Mr. CRIPPS: They could not have charged it without going for revision, nor could they have charged it under the Act of 1868 without going for revision; that is equally necessary in both cases?

Witness: But no company under the Act of 1860 would have charged 4s. 6d.

Mr. CRIPPS: You do not seriously suggest, as a gas manager and director, as a solution of this difficulty, a return to the Act of 1860?

Witness: I never heard of any legislation that ever suggested going back. I do not suggest it, but I still say the Act of 1860 is the better Act. The whole of the £144,000 which we capitalized had been laid out upon works, and it was proved to the satisfaction of the Legislature that it was so. It had been accruing from year to year, and the last time in which anything was put to that sum was, as far as my memory serves, within a year or two before the capitalization took place. That 10 per cent. and 5 per cent., and the 7½ per cent. upon the new stock created in 1864, have all gone on undiminished in dividend down to the present time; but in addition we have called up £175,000 at 5 per cent., and that has kept the average rate of the money called up since 1864 down to 6¼ per cent. That continuous prosperity will go on, unless it is interfered with.

Mr. CRIPPS: I am glad to hear you say so; in other words, you will give the people better gas and divide better dividends?

Witness: We cannot divide better dividends. If we had a sliding scale, and once paid an increased dividend, the Metropolitan Board would say that it did not answer their purpose, and they would come again for a new Act of Parliament directly; that in my sincere belief is the morality of the Board of Works.

Mr. CRIPPS: Supposing people are not so black as you imagine them to be, and assuming things to go on in the ordinary way, you would be able to divide more than 10 per cent. for the future?

Witness: If we remain as we are now.

Mr. CRIPPS: Supposing to-morrow you could make out that you had spent upon the works a considerable sum beyond the £144,000, and capitalized it at 5 per cent., you have no doubt whatever you could pay it?

Witness: That is not a thing likely to happen.

Mr. CRIPPS: Supposing by any arrangement of that sort you found that you could raise another capital of £200,000 at 5 per cent., could you pay dividend upon it?

Witness: If we were entitled to it we should try and get it.

Cross-examination resumed: When I became a director in 1850 the first contract for coals was made at 4s. 4½d. free on board—the very same coal we are now giving 9s. and 9s. 6d. for. I cannot give the price for five years before 1860.

The CHAIRMAN: Looking at Mr. Field's tables as regards purchases of coals, wages, and so forth, the Phœnix seem to me to compare very well with other companies.

Witness: Taking coke out of the question we manufacture lower than the South Metropolitan, I believe.

Mr. CRIPPS: What I want to arrive at is, that this continual prosperity shown by your company from the districting time cannot be attributed to any difference in the price of coal?

Witness: No; I think the great economy produced by the districting has been the real foundation of the success. Our consumption does not increase so rapidly as the other companies; it is about 4 per cent. I do not know why our coals should be less than the South Metropolitan, because, although the company have to pay 6d. dues on the canal, they have some arrangement with the Commercial Dock Company by which they get their coals landed at a less rate. The ships do not go into the canal, but the coals are delivered into the gas company's own barges.

Re-examined by Mr. RICHARDS: It may fairly be taken that whilst on the one hand the company have benefited in getting an increase and a more certain dividend under the districting system, the consumers, on the other hand, obtained a reduction in the price of gas down to Jan. 1, 1874. We probably should not have raised the price then, but it was impossible to see the course the coal market would take. The amount of the capitalized profits might have been expended in dividend; instead of which it was expended on plant.

Mr. RICHARDS: My learned friend puts it to you that if you continue as you are going on now you might make more than 10 per cent.—that is to say, if the price of coal does not rise again?

Witness: If we have to make 16-candle gas we shall not be able to earn our 10 per cent.

The CHAIRMAN: How much money would you have to pay into your reserve-fund under your Act before the price could be reduced?

Witness: I think about £103,000 altogether, nearly £50,000 being already paid.

Re-examination resumed: We have, in point of fact, over and over again reduced the price when our reserve-fund was less than now; it only stood at £20,000 when we made our last reduction, for which we did not get any credit, nor do we expect any.

By the CHAIRMAN: We find ourselves obliged to charge 1s. more than the South Metropolitan, in consequence of our capital being much larger in proportion. The reason why our capital is so much larger is because competition was allowed in our district. No doubt a great deal was wasted through the Legislature allowing three or four companies to be supplying in one street. If that had never taken place, probably our gas would have been 3s. now. The South Metropolitan was established in 1833 or 1834 and the Surrey Consumers at a more recent date. It is the capital which was invested a long time ago which causes the difference; and, being an old company, the materials of which the works were constructed were much more expensive than now. Our present paid-up capital amounts to £1,027,000, a large portion of which has been called up since 1860.

The CHAIRMAN: And therefore is not accounted for upon the ground of the necessity arising from competition which began before 1860?

Witness: No, a good deal would not be, but it has been very economically laid out.

The CHAIRMAN: Then inasmuch as your consumers have to pay 1s. more than they do to the South Metropolitan because of your having so much capital, why have you had to invest so much since 1860?

Witness: Because the demand from the public has been constantly increasing, and we had to make works to supply that demand. The whole of Vauxhall station—which is our largest works—has been constructed since 1860; one-half of the whole of the coals consumed are carbonized there.

Mr. BRASSEY: Are they entirely new works? If so, how used you to supply that district before?

Witness: There was not the consumption nor the demand.

The CHAIRMAN: It merely shows that you have a fresh district, and that you have erected works to supply that district, and I suppose the South Metropolitan have done the same; but why should the capital which you called up for that purpose be so much larger than it is in the South Metropolitan?

Witness: I do not know that it is larger in proportion. The South Metropolitan capital is under £300,000, and our business is more than double theirs. As I interpret the Act of Parliament, there is no power to make us reduce our price until our reserve is full.

The CHAIRMAN: Is it not rather in the interest of the shareholders, and the interest of the directors, to get out as much capital as they can?

Witness: No, it is not.

The CHAIRMAN: It would seem to me that it was, because you can keep up the price in order to obtain this full interest.

Witness: On the contrary, I have stated that for years past, in all the works we have made, we have made the works and not called upon our proprietors for the capital until they were erected and in operation.

The CHAIRMAN: I do not ask what you have done; I simply ask what is your interest, as shareholders and directors?

Witness: I do not think it is our interest, as honourable men, to do so. I should be ashamed, in my position, to call up capital merely to secure getting dividend upon it.

The CHAIRMAN: Then it appears to me that is rather finding fault with the Act of Parliament which gave you power to do it?

Witness: The Act of Parliament gave us the power, but it does not follow that we should take advantage of it; I can unhesitatingly say that we have never taken advantage of it.

The CHAIRMAN: Are you quite sure that the fact that you could get this large interest upon your capital guaranteed by Act of Parliament has been no reason why your capital is so much larger than that of the neighbouring company?

Witness: No, certainly; it is no reason why it is larger.

Mr. BRASSEY: Would you say that you have in this respect been exceptionally unfortunate, that you have made a provision for the demand which you expect to arise, but which has not yet arrived at such a point as to give fair employment to the whole of the works that you have made?

Witness: No, that is not so; our works are nearly full.

By the CHAIRMAN: The present price of our shares in the market is £37 for a £20 share. When we allotted our 7½ per cent. stock in 1864, it did not make any difference in the price of our shares. The premium upon it was very small for a long time; in fact, we were not able to get it out, the reason being, I suppose, that gas was an unpopular thing. Upon the whole, I think our cost of manufacture is lower than the South Metropolitan.

The CHAIRMAN: Then does it not strike you that 1s. is an enormous difference to be obliged to charge to the consumers, while you are not allowed to pay as large a dividend to the shareholders as the South Metropolitan?

Witness: We have only been charging that to the consumer under very abnormal circumstances. The difference between us has only been 4d. or 5d. till lately. They were charging 3s. 4d. up to a recent period, when we were charging 3s. 9d.; and we shall be at 3s. 9d. again, no doubt, if coals continue at the same moderate rate. In fact, I unhesitatingly say that if coals had not gone up as they did, and continued at about 14s., our price would have been 3s. 6d., to which price we were on the verge of reducing when the immense rise of coals took place. If prices remain as they are, I think we shall about make our dividend, with our present illuminating power, at 3s. 9d. At Christmas, 1874, we had a surplus of £1424, which was carried to the reserve-fund.

Mr. BRASSEY: What rate of interest do you think you would be obliged to allow in order to raise a preferential or debenture stock up to par?

Witness: We have bonds, which, I suppose, are considered the same thing, at 5 per cent. I do not think we could raise capital at that price. I intended to have brought a list here to-day, to show you a calculation made by a stockbroker of the rate of interest paid by all the companies at their present prices, by which you would see that we could not raise capital at 5 per cent.

Mr. BRASSEY: Supposing, in some form or other, the rate of interest at 5 per cent. were guaranteed to the bondholders by the consumers, in the same direct way in which the Metropolitan Board stock is guaranteed by the ratepayers of the metropolis, then you would say there would be no difficulty whatever?

Witness: None at all.

Mr. BRASSEY: Practically from the interpretation you have put upon the Act of 1860, and the mode in which that Act has been carried out, a dividend of 10 per cent. is substantially guaranteed to your shareholders by the consumers?

Witness: I do not think you can say they guarantee it. I should doubt whether public bodies like the ratepayers would be right in taking such a liability upon themselves; they might lose all their money some day, in the event of some other illuminating power being discovered.

Mr. BRASSEY: Are you in a position to say generally whether the other gas companies have increased their capital in a much more rapid ratio since the passing of the Act of 1860 than they did before?

Witness: I should think they have only called it up to meet the demands they have from the public, they being under obligations which oblige them to extend their works.

Mr. BRASSEY: As they were not bound to make and supply before 1860, so in point of fact they did not increase their works so rapidly before the year 1860 as since?

Witness: No doubt they would not subscribe any more capital than they could possibly avoid.

Mr. BRASSEY: Do you think that the public derives a greater advantage from the present position, which certainly is not of a kind to deter the directors from increasing their works in proportion to the demand?

Witness: Yes; the price of gas is lower than it was then.

Mr. BRASSEY: And there is nothing in the financial aspect of the question to prevent the directors of different companies from increasing their works fully as much as the demand increases?

Witness: No, I think not.

By the CHAIRMAN: There have been, no doubt, great improvements in the manufacture of gas since the Act of 1860 was passed, but then the price of the raw material has increased, and iron is much more than it was. I should think the works erected before that year would cost more than if made at a more recent period.

By Mr. TALBOT: I think the consumer is very much benefited by the improvement in the quality of the gas, which years ago was not more than eight or nine candles.

By the CHAIRMAN: I base our claim to what I call the parliamentary guarantee upon the Act of 1860, together with the Acts of 1847 and 1864. The Act of 1847 was a public Act for gas companies throughout the kingdom, and it applied to many companies who were subject to competition. I am not aware that gas companies have made any provision against the possibility of some other light being devised. When the electric light was first introduced in 1839, an enormous fall took place in gas shares. I do not think it is now the opinion of persons conversant with gas matters that there is any real danger to gas property from some other light; I think the very cheapness of the gas would ensure its use. The amount of our capital remaining to be called up is £160,000, and we have also a further borrowing power of £25,000, so that we are in a position of being able to look forward to several years before we should find it necessary to apply to Parliament; and we therefore think with Mr. Cardwell, that, not being before Parliament, we ought to be exempt from any legislation now.

Mr. *Corbet Woodall*, examined by Mr. RICHARDS.

I am chief engineer to the Phœnix Gas Company, and have the sole control of the Vauxhall and Bankside stations. The instructions of the board are to work up to between 15 and 16 candles, which is the same as if we were supplying 14 candles under penalties. We use about 3 per cent. of cannel on the average, according to the quality of the coal. If we were compelled to supply 16-candle gas, we should have to produce from 17½ to 18 candles, which would involve an increase in the cannel of 6 per cent. beyond what we now use. The cannel coal is limited, and the greater the demand, the more we find ourselves in the hands of the dealers. In 1869 the amount of our capital for every 1000 feet of gas sold was between 19s. and 20s., and in 1874 it was reduced to 16s., although there had been an increase of capital between those years. I do not think that shows a want of due care and management. In 1869 the dividend required 19½d. per 1000, while 15½d. was wanted in 1874. We use our utmost endeavours to get the best price for coke. I have prepared a statement explaining the difference in price charged by the Phœnix and the South Metropolitan Companies for the years 1869 to 1873, inclusive. The amount required per 1000 for dividend ranges all along higher than the South Metropolitan. In 1869 the Phœnix required 19·5d., and the South Metropolitan 12·6d., and so it runs all through until it works out with an average difference of 5·8d. at the end. In 1869 the net cost of coal to the Phœnix was 9·47d. per 1000 feet, and the South Metropolitan 9·42d.; that is a difference of ·05d. In 1870 the Phœnix was 8·86d., and the South Metropolitan 8·52d., the difference being ·34d. In 1871 the Phœnix was 9·91d., and the South Metropolitan 8·36d., the difference being 1·55d. In 1872 the Phœnix was 10·73d., and the South Metropolitan 8·58d., the difference being 2·15d. In 1873 the Phœnix was 12·22d., and the South Metropolitan 11·14d., the difference being 1·08d., giving an average difference in price of 1·03d. Taking working expenses, ours were ·35d. higher in 1869; ·51d. higher in 1870; ·92d. higher in 1871; 1·33d. higher in 1872; and 2·42d. higher in 1873, making an average difference of ·90d. per 1000 feet.

By the CHAIRMAN: Our working expenses have risen during the last three years, because we have had to make very considerable renewals of our works, which we have not charged to capital account. The difference is entirely upon the question of wear and tear; upon all the other items there is an advantage to the Phœnix. We have especially an advantage in wages. In the event of the renewals being an increase of the producing powers of the works, the difference would be fairly charged to capital; but in this case it has been renewals not fairly and properly chargeable to that account.

By Mr. BRASSEY: We use the same discrimination in placing the charge against revenue and capital accounts, which would be exercised in the case of a company where the dividend was not guaranteed.

The CHAIRMAN (addressing Mr. Richards) said he thought it was hardly necessary to bring out further facts with regard to the actual management of the business of the company. The committee were prepared to admit that there seemed to be no proof, as compared with the South Metropolitan, of want of due care and management, so far as the manufacture was concerned; but that left the question of capital entirely outside.

Cross-examined by Mr. O'HARA: By using lime we should probably be able to dispense very nearly with the use of cannel coal, in order to keep our present illuminating power; but if we add two candles to our illuminating power we should have to use 6 per cent. of cannel, even with the lime. The diminution of our capital from 19s. 8d. to 16·07s. per 1000 feet of gas, is all due to the increased consumption of gas, except that we have slightly increased the quantity of gas sold per ton of coal used. If our business had not increased, we could not possibly have diminished the proportion existing between the two; we should have stayed where we were. Admitting that our business increases in the same ratio, and our capital remains the same, we may look with confidence to a further diminution of about 4 per cent. per annum. The South Metropolitan charge no meter-rents, and we do. I think our charge per 1000 feet of gas sold amounts to about ¾d.

By the CHAIRMAN: We charge a rate per annum for the meter, and there may be passed through it 1000 feet of gas or 20,000 feet of gas.

By Mr. BRASSEY: The annual revenue we derive from meter-rents is a light burden upon the consumers. I should think about £2000. Assuming we went before the commissioners, whatever amount we charged for meter-rent would be deducted in the sum allowed to be charged for the gas.

By Mr. O'HARA: The difference in our position from that of the South Metropolitan and the London for the disposal of coke is that at Vauxhall we distil the greater portion of our coal, and we have close to us the Pimlico station of the Chartered, and the very large works of the London Gas Company at Nine Elms. The quantity produced within the radius that would embrace those two is so large that the demands of the neighbourhood do not anything like enough meet it, and therefore we sell a considerable quantity to go down the river in large parcels. We are obliged to make contracts in advance, because the works at Vauxhall are limited in extent and we cannot store very largely; consequently we are unable to take advantage of any considerable rise in price, like those who are able to sell the whole of it from the works. The London Company have very much more extensive premises than we have, and they have an open side, as it were, from their works, extending out some distance, whereas we are surrounded on both sides by other coke-producing works.

The CHAIRMAN: Whence does it arise that in 1869 you got more per 1000 feet sold for your coke than the South Metropolitan Company did, and in 1870 you got almost the same price, but in 1871 you began to get so very much less?

Witness: There is a difference in our method of carbonizing coal; we sell 10 per cent. more coke from each ton of coal than do the South Metropolitan Company, so that the disparity is greater than appears by the returns. We sell, as a rule, nearly 80 per cent. of the coke we make, and the South Metropolitan Company about 70 per cent.

The CHAIRMAN: We need not push this any further.

Re-examined by Mr. RICHARDS: From the amount of capital invested in the works since 1860, the £144,000 of capitalized profit must be deducted. The South Metropolitan have also added at least £80,000 out of profits to their capital. Purifying by lime creates about as great a nuisance as it is possible for a human being to create, and it is almost impossible to use it where the works are situated in a thickly-populated neighbourhood, the difficulty of removing it being very great. In the Acts of 1868 and 1869, in which the referees have unlimited control over the purifying processes, there is an express reservation that the companies are not to use lime where it would be a nuisance to the neighbourhood.

Mr. RICHARDS: It has been put to you that, looking at the past, and to the reduction of the capital per 1000 feet, if you go on as you have been going on, you may look to a still further reduction in the future. Must you not also look to the necessity of a further capital expenditure, in order to meet that further demand?

Witness: Certainly. I believe, in the current year, there will be a reduction in the amount required for dividend, as compared with 1863; but we are rapidly filling up our works, and shall require to build further ones, and then the difference will go the other way, and we should spend more than would be represented by our increased rental.

By the CHAIRMAN: I have seen a great many improvements in the manufacture of gas, and hope we have not reached the end of them. There have been improvements latterly in chemical purification of gas, which have been exceedingly costly to the companies which had to adopt them. I should be very sorry to believe that science has reached its limit, even as regards the cost of gas.

The CHAIRMAN: That being the case, what is your opinion of the proposition now before the committee, which was chiefly supported by Mr. Livesey, that a gas company should be able to get an increased dividend upon supplying gas at less cost?

Witness: I do not like it at all; I think it introduces an element of gambling which is not at all wanted. The competition already existing between the companies is very keen; they all strive their utmost to reduce the price. A fresh discovery would tend to the advantage of the shareholders as well as the public. When I used the word "gambling," I meant it more in relation to management; there might be an attempt to show fictitious profit, in order to secure the advantage of such a scale. I consider that we have at present a very great stimulus to economy, and I cannot see that it would be in any way fair that, from circumstances over which we have no control whatever, the dividends of the shareholders should be reduced. On the other hand, it is plain, from the evidence that you have had from the chairman, that the dividends already paid are regarded as satisfactory, and therefore I think there is no justification for decreasing those from circumstances which are not due to improper care and management.

The CHAIRMAN: As regards the action of private manufacturers, there the profits of the concern depend entirely on the economical and good management of the business; and does not there appear to you to be some advantage in putting gas companies in the position in which manufacturers generally are, to some extent?

Witness: Do you bear in mind that we are now under regulations whereby wasteful expenditure may be watched and checked?

The CHAIRMAN: That is an answer suggesting an alternative: but do you not think there would be an advantage, although, perhaps, counterbalanced by disadvantages, in putting the gas companies upon the same conditions of profit and loss as those which apply to manufacturers generally?

Witness: I must say I do not. It would not be an improvement on the system already prevailing, whereby, if by proper care and management we can earn our dividends, we get them, and if we cannot, we must still suffer. I think it has been anything but proved that the gas companies have a guarantee altogether irrespective of due care and management.

The CHAIRMAN: Supposing you earn more than 10 per cent. dividend upon your capital, would it be possible for you to use that dividend by issuing fresh capital? I do not say that the directors do so; but do not you consider there is something in that system which would be an inducement to do it?

Witness: I do not at all. It seems to me it would be suicidal, apart altogether from its dishonour; and it would be exceedingly injurious to the con-

earn to do it, because to be overweighted with capital is a dangerous thing. We find from the cost of the site of our works, and the purchase of interest already existing upon them, that we are burdened as compared with the South Metropolitan. The constant effort of our company is to reduce that burden.

The CHAIRMAN: How is there any danger to your company in being what you call overweighted with capital?

Witness: It is more difficult to earn a dividend.

The CHAIRMAN: But then you have what is tantamount to a security for it?

Witness: Not an absolute security.

The CHAIRMAN: You say that no amount of capital you are likely to invest would endanger your receiving your dividend, if you went up to the full price of 4s. 6d., and by your Act of 1860 you have the right to that price, if it is necessary to produce a dividend upon your capital?

Witness: Yes, unless bad management can be shown.

The CHAIRMAN: Then I do not quite see how you believe, as you evidently do, that it is against the interest of your directors to put out as much capital as they can?

Witness: I say that the circumstances in which my company and others are placed, are circumstances that have arisen in the course of our trading, which we have hitherto regulated and have sought to meet. Our company, as compared with others, has a heavy weight of capital, and that is a matter that fairly stimulates us to try and bring it into bounds, because the directors must feel that as the absolute value of their plant is increased in proportion to the business done, so is its stability and value to them increased.

The CHAIRMAN: Surely the larger their plant the greater is the dividend that is paid to the shareholders; and inasmuch as 10 per cent., and even 7½ per cent., is very much above the usual return for capital, it must be an advantage to them to have as much capital out as possible.

Witness: From that point of view, yes. I was simply going to say that a sliding scale would have just as much inducement if it worked downwards, as was proposed in 1866—that is, that if the price of gas was reduced below the minimum that the dividend should go up—if there was a margin left within which it should not operate; that being, in fact, the suggestion made by Mr. Livesey in his address to the British Association of Gas Managers. His recommendation was that a sliding scale should be adopted with a range within which it should be inoperative; say, for instance, that the dividend of the company should be increased if the price went below 3s. 6d., but should not diminish unless the price went above the maximum charged by the Act of 1860. In that case the inducement, so far as it would exist, would be there, without the unfairness of taxing the company for variations over which they have no control. It is unfair to suppose that circumstances such as existed in 1872 and 1873 will not occur; and then such a price as is proposed now would be utterly inadequate for the payment of anything like a fair dividend upon the capital, and that from causes over which the company would have no control. I must say I fully agree with Mr. Burke that if we did not go down we should have agitation again, and I think with Mr. Chubb that the feeling of the consumers is not so much that the price of gas is too high, as that the dividends of the companies are too high.

By Mr. TALBOT: There always will be a certain amount of dissatisfaction, but that there is anything like the agitation represented I deny. I have never met with any complaints as to the noxious character of the gas, and as to its damaging furniture, and so on. As to the probability of any light superseding gas it is impossible to form an opinion. Not a year passes without our having to inquire into one matter or another, professing either to cheapen or provide a substitute for gas.

By Mr. BRISTOWE: Our gas is tested by the "London" burner.

By the CHAIRMAN: I have never found the difference equal to more than 1·3 between the burner adopted after the passing of the Act of 1860 and the burner now used as the standard. I consider our old 12-candle stipulation about equal to the 14-candle now.

Mr. Rohde Hawkins, examined by Mr. RICHARDS.

I am chairman of the London Gas Company, and have been a director of the company for eight years. Our works are situated at Nine Elms. The expenditure in every part of the works is accurately investigated and laid before the board every week. We carefully compare our present with our previous workings, and with the workings of other companies from time to time. We exercise every possible care and economy in the manufacture. There cannot be any greater security for our property than the production of an article at the lowest possible price, because each company feels a pride in being able to produce gas at a lower rate than its neighbours.

By the CHAIRMAN: There is a moral competition between the companies, as distinguished from a competition which generally exists among traders to get as much money as they can.

Examination resumed: Our company is one of those under the Act of 1860. I take a stronger ground with regard to the London Company than Mr. Horner did respecting the Phœnix, and that is, that whereas the Phœnix and some of the other companies are under the legislation of 1860, my company, so late as 1866, was before a committee of the House of Commons, of which Sir John Trollope was chairman. We had heard that he was not very favourable to the gas companies, and yet, after the closest investigation of our position, that committee empowered us to raise something like £400,000 more capital. Therefore I hold that, taking the Act of 1860, supplemented by the larger power of that Act of 1866, our position is an exceedingly strong one, and anything which interferes with it would be even more unjust to us than to the other companies.

Mr. RICHARDS: It has been stated that there is a clause in your Act of 1866 which renders you liable to adopt any change which may affect any other four metropolitan companies, and a legal question exists as to whether you are or are not, at the present moment, brought under the Act of 1868 by the operation of that clause; or, at any rate, it is suggested that if the Commercial Company should be brought under that Act, the London will follow as a matter of course.

Witness: I do not see how we can be. That clause says we shall "reduce our price for the same kind of gas to the average of the maximum price to which four or more other companies are limited." The companies under the Act of 1860 have a maximum price, to which we are limited, that maximum price being 4s. 6d. at our own option, and 5s. 6d. if the Secretary of State approves of it. But, as I read the Act of 1868, there is no limit, there being no maximum price.

Mr. RICHARDS: There is a price named, subject to revision.

Witness: Yes; but that is not a maximum price.

FRIDAY, JUNE 18.

The learned counsel on both sides stated that they agreed to Mr. Field's books being handed in as evidence to be referred to as part of the proceedings.

Mr. *Rohde Hawkins* recalled, and further examined by Mr. VENABLES.

The illuminating power we are compelled to give is 12 candles; but, judging by the burner of 1860, we actually give from 14½ to 15 candles. We consider that the whole of our capital has been raised by agreement between Parliament on the one side and our company on the other, which principle was first affirmed in 1860, and again recognized in 1866. Those terms are proposed to be altered by the present bill, and, like the representatives of the other companies who have been called, I certainly object to that proceeding. I concur with other witnesses that the standard of illuminating power ought not to be higher than that which can be supplied by using common coal, because cannel is very limited in quantity, and if we used a much larger quantity in London we should unsettle the price enormously, which would act injuriously, not only upon the London consumers, but upon the consumers in the large towns of the north, who burn a great quantity of gas made from cannel coal. I do not see how it is possible to make the cost of gas to the companies uniform, whatever may be done with the price. The largest element in the cost is coal, the next being labour, which we cannot control. With regard to the price, I consider at the present time, with coals and products at their present price, we might manufacture at 3s. 9d.; but if coal rises, it would certainly not be possible, retaining our dividends, to supply at that price. I am aware that it has been suggested on the other side that a gas company has no motive in studying economy and producing cheap gas, but there are at present our neighbours, the South Metropolitan and the Independent, who both manufacture and sell cheaper than we do, and that decidedly exercises a moral pressure upon us to produce as cheaply as we can. Our price in 1860 was 4s. 6d., it was lowered to 4s. in 1866, and in 1869 reduced again to 3s. 9d., at which price it remained till 1873, when, under the powers of the Act of 1860, we raised it to 4s. 6d. The price at the present time is 4s., and it will be further reduced if the price of coal goes down, and if we are freed from the heavy legal expenses in this case. I have had my attention called to the legislation of 1868 and 1869, which has not affected our company; and my own feeling is that in all mercantile transactions the freer you leave the manufacturer, the more likely is he, if he is an honest man, to make an economical arrangement of his business; and as in our case we cannot divide more than a certain rate of interest, all that economical arrangement which I believe we should be able to make, would be for the benefit of the consumer. In point of fact, my opinion is that free labour is a great deal better than slave labour in this as in everything else; and if the board of directors are honourable and careful men, the public will gain the advantage the more free they leave us in our operations.

Mr. VENABLES: I was rather asking you in this case to compare the machinery of the Acts of 1868 and 1869 for revision by commissioners, with the provisions for increasing the price in your Act of 1860.

Witness: I meant to do so to a certain extent; that, of course, did tie the hands of the companies more than in 1860. We are enabled to raise the price when we see fit, without the expense of the revision; and that revision appears to have been extremely costly to the two companies, or rather to the public, whenever it has taken place. We have never gone as high as the two companies under revision. We might be able to watch the state of the market, and other circumstances which affect the question, and so begin to rise earlier, and not necessarily go up so suddenly; but in such a particular case as 1873, we did not rise as early as the companies who were under revision—they rose from the 1st of January, and we rose from the 25th of March. The operation of the reserve-fund is, that it enables the rise and fall to be made more gently. A very little would obviate any rise at all, because, having a small reserve-fund to fall back upon from time to time, you may go to it without having a rise. In one half year we were £3000 or £4000 to the bad; if we had been under revision, we should have been entitled to have had the whole of our working gone into at great expense in order to recoup that money, but we had a reserve-fund, and took the amount out of it. For that reason it must be very much to the advantage of the consumers for each company to have a reserve-fund. As to the principle of the sliding scale as now proposed, it seems to be directly opposed to what I consider a sort of contract made between Parliament and the companies. If the whole principle of a sliding scale was submitted *de novo*, it would be worth going into; but I, as representing a gas company with a parliamentary guarantee, almost, of my dividends, am not prepared to go accept it. The proposal of the sliding scale involves the taking away of the reserve-fund, and that would be objectionable. I do not think it would be to the advantage of the companies, even if it did operate in that way, that they should divide a much larger dividend than 10 per cent., because it would simply subject us to more attacks upon the part of the Metropolitan Board of Works, or any other body of people who are interested in keeping down our profits. A lower dividend than 10 per cent. would not excite any compassion. In one year we drew as much as £10,000 from our reserve-fund. As regards the referees, we would rather have them appointed by the Board of Trade; the method proposed by this bill would only lead to litigation.

Mr. BRISTOWE: There might be a difficulty in working it out, and getting all the companies to agree upon one referee.

Examination continued: The penalties for any infringement of the Act have been found amply sufficient, and I do not think it is necessary to increase them, no case having been made out for such aggravation. Our company are not under the public auditor at all; we make a return of our accounts to the Board of Trade, and they may look over them if they please. I should not like to have a body like the Metropolitan Board of Works auditing our accounts, and I do not think the public auditor would much like it.

Cross-examined by Mr. CRIPPS: The substantial difference between the legislation of 1860 and 1868 is, that in one case the companies do not have to apply to any tribunal, so long as their charge does not exceed 4s. 6d., while in the other they must apply for revision if they want to exceed 3s. 9d.

Mr. CRIPPS: With regard to the clause in your Act of Parliament, on which you gave your impression very fully yesterday, do you assume that, supposing provision were made for regulating the price of gas supplied by four of the 12 companies, below the price of 4s. charged by your company, that you would not have at once, by virtue of that clause, to reduce your price to 3s. 9d.?

Witness: If the maximum price was named beyond which the four companies could not go, we should be bound, as I understand this clause, to reduce our price to that maximum price; but the price subject to revision is not the maximum price.

Mr. CRIPPS: You believe the meaning to be that, a provision being made, in the Acts of any four companies, for reducing to 3s. 9d. as the maximum price, except there is a revision, really means nothing unless the maximum price named were 5s. 6d.?

Witness: It appears to me, as far as I can understand this clause, to a great extent to have that meaning.

Mr. CRIPPS: What upon earth was the object of putting such a clause as that into the Act of Parliament?

Witness: I do not know, but that is my impression. I cannot undertake to explain the clause, but you mentioned it in your opening speech, and Mr. Newton mentioned it in his evidence, but the Metropolitan Board have never acted upon it. I do not know how a price, subject to revision, can be the maximum price. The proposed sliding scale would be a direct breach of the engagement between us and Parliament. In 1860, when we came under the same provisions as the other companies, we had no bill of our own before Parliament. In 1858 we divided 3 per cent., but for some years previous we had not divided anything. In the previous year, 1857, the districting not sanctioned by Parliament had taken place between the companies. In 1861 we paid 5 and 6 per cent.; in 1861 and 1862, 7 per cent.; and from 1863 to the present time, 10 per cent.

Mr. CRIPPS: Assuming the price to have remained the same, is there any reason you can suggest why that prosperity should have gone on so rapidly to 1863, and then have remained at a dead level ever since?

Witness: We could not get any higher.

Mr. CRIPPS: All you have done since is to reduce the price 6d. to the consumer, and for a short time 9d., but now you charge 4s.?

Witness: Yes.

Mr. CRIPPS: During those years, and up to a very late period in 1873, there was no great difference in the price of coal to account for this, was there?

Witness: It varied, but not very materially.

Mr. CRIPPS: Then this continuous rise in prosperity may be fairly attributable to better management?

Witness: Better management, and a cessation of competition.

Mr. CRIPPS: Can you have any doubt, looking to that and reasoning from the past, that if you have a sliding scale you could in the same way in a year or two go on with increased prosperity, so as to be enabled to divide a larger dividend than 10 per cent.?

Witness: I have very serious doubts of it. Coals are very dear, and the labour market is exceedingly unsettled. We have to buy iron and retorts, and a variety of materials for carrying on our business, all of which are dearer now than they were. Wages at the present time are 30 per cent. dearer than they were ten years ago.

Mr. CRIPPS: And you are making an increased quantity of gas. Taking the price due to labour for every 1000 feet of gas, do you know that the amount chargeable out of that price for labour is not materially more than it has been?

Witness: It is a matter of fact, and for whatever it is worth it is down in that book.

By the CHAIRMAN: According to Mr. Field's tables, the wages per 1000 feet of gas sold were 4·82d. in 1869, and 5·72d. in 1873, the average of all the companies being 4·86d. and 4·98d. That shows our wages have risen more than the average.

Cross-examintion resumed: The amount of dividend which our share capital at present requires is about 7¼ or 7½ per cent.

Mr. CRIPPS: Supposing the new capital which you have henceforth to raise were to be raised at a price not exceeding 5 per cent., and your business were to go on, you would require a less sum per 1000 feet of gas sold to pay your dividend every year, and that saving, looking to the future, would be very considerable, would it not?

Witness: I do not know that it would. It would be a long time before we should require to avail ourselves of additional capital.

Mr. CRIPPS: Has it not occurred to you that the sliding scale, up and down, has a material effect upon what can be done fairly with future capital? That future capital at 5 per cent., or at a lower rate of interest, will enable the companies to work cheaper, and enable them to have a larger dividend upon the capital?

Witness: If you mean that we could get our capital a great deal cheaper, the sliding scale would not injure us as much as it would under the present circumstances.

Mr. CRIPPS: I put it far beyond that. Would it not be a direct benefit for you, or anybody interested in the sliding scale, to have the future capital of the company raised at as low a rate as possible?

Witness: If you screw me down to an arbitrary price like a sliding scale, the lower I can raise the capital the better.

Mr. CRIPPS: About the reserve, if you can get in one year by the sliding scale an amount more than the 10 per cent., and that is left in your hands, and you divide it amongst your shareholders, it is a reserve against any decrease in the scale?

Witness: I do not see how it is a reserve to make up dividend if it is out of my hands. I do not understand that the bill would enable the gas companies, if they made in any year money enough to pay 12 per cent., to put 2 per cent. of it quietly by into the reserve-fund without lowering their price.

Mr. CRIPPS: What would it signify? If the shareholders desired to have it you would be compelled to pay it over; if they desire somebody else to keep it for them, you or anybody else can keep it for them.

Witness: It is clear to common sense that if we locked up a sum for a year or two I should be sitting here and you would be standing there again on behalf of the Metropolitan Board to get it out of us.

Cross-examination continued: Our accounts are kept, not for the consumers, but for the Board of Trade, whose object it is to protect the consumers. It is materially to the interest of the company to work as cheaply as possible and reduce the price whenever they can.

Mr. CRIPPS: If your accounts show you can divide 10 per cent., the interest of anybody in those accounts is that of the consumers, but you object to anybody, on their behalf, making a thorough examination.

Witness: You never asked us. Anybody can obtain them as they are published; but when a gentleman of high authority and reputation is appointed by the Board of Trade, we object to the Metropolitan Board of Works sending another auditor to audit him.

Re-examined by Mr. VENABLES: Supposing the Board of Works had the power to examine our books, irrespective of the official auditor, that would be, to a considerable extent, turning an independent audit into a contest, because it would be by a body who had an adverse interest to us.

Mr. VENABLES: With reference to your interpretation of the Act of 1860, it would appear, if Mr. Cripps's contention is right, that you are to reduce your price to the ordinary maximum prescribed to any company; and, although that company had the power of going to the commissioners to raise the price, I do not see any provision that you should do the same. Consequently, the suggestion is that the Act must mean that you should reduce your price to their ordinary maximum, and that, when they go up by revision, you should not go up by revision?

Witness: Yes; That is so.

Re-examination continued: We have done away with working on Sundays, and we make certain allowances to the men in consequence, which slightly increases the cost.

By Mr. BRISTOWE: In 1866 we obtained power to raise £300,000 by 6 per cent. preference shares, and £100,000 on loan. Of that amount there remains £109,000 of share capital not issued, and borrowing powers to the extent of £38,000.

Mr. VENABLES: As to the reserve, it was suggested that if you made under the sliding scale in any year 12 per cent., you might put by 2 per cent.

Witness: I do not understand the bill so. There is no provision for a reserve at all. We should be absolutely debarred in a good year from laying by anything for the reserve. To keep back 2 per cent., we must have the consent of every single shareholder to the arrangement. The suggestion that the shareholder might keep it as a reserve for himself is not a very practicable one, and would not conduce to the advantages which I think are obtained by the reserve.

By the CHAIRMAN: We have to charge 1s. more than our neighbour, the South Metropolitan, on account of capital. In 1860 our capital was £650,000, and the amount now upon which we have to pay dividend is £844,000, including loans on which we pay 4½ per cent. Our capital stands at a far less rate of interest than the South Metropolitan.

The CHAIRMAN: I want to know why the consumers in your district have to pay 1s. more than in the South Metropolitan district. That must arise from one of two things—either that the cost of your gas must be greater, or that a much larger proportion of every 1000 feet has to go to dividend on capital.

Witness: I believe we are working quite as cheaply as the South Metropolitan.

The CHAIRMAN: That puts it all on the capital, and it appears that you have only to pay 1s. 3½d. to make up your dividend as compared with the 11d. of theirs; therefore, that will not account for your charging 1s. more.

Witness: We have kept on 3d., which will produce about £12,000, to meet the expenses of this inquiry.

The CHAIRMAN: Do you really expect that this inquiry will cost you anything like £12,000?

Witness: No; and we will take it off as soon as we see our way out of it. We had notices printed to send out to our customers, reducing the price to 3s. 9d., but we withheld them when we found this inquiry coming on. We knew from old experience what it was to fight the Metropolitan Board. In Mr. Field's book our capital is put down at 18s. per 1000 feet sold, which is the highest of any except the Chartered, but there is a little memorandum at the bottom, stating that is exclusive of 46 million cubic feet of cannel gas, which we buy and send out, and that reduces the proportionate price per 1000 to about 17s. and a fraction.

The CHAIRMAN: Take the capital employed per ton; you are the highest of any company—£17 18s. 10d. I want to know why you have so very large a capital, especially as it is your opinion that the difference of the capital is the reason why you have to charge this price to the consumer.

Witness: It would be going back to the early history of the company, when we had to compete with the most wealthy and most powerful company in London—the Imperial Gas Company. Another thing was that we erected our works in the first instance upon leasehold property, fully expecting from time to time that we should be able to renew. When the lease ran out, the Duchy of Lancaster refused to renew, and we had to buy a new site and reconstruct our premises.

The CHAIRMAN: Taking your answer that it is a great deal owing to your previous competition with the Imperial Company, does it seem to you altogether a fair thing that you should have a statutory power to charge higher than your neighbours, because in past years you had a competition with another company?

Witness: I would humbly submit that the whole question was gone into in the year 1866, and that the committee then were at all events so far satisfied that they gave us power to raise additional capital.

The CHAIRMAN: You said you gained by the Act of 1860 in the absence of competition; supposing you had not that gain, and that you were exposed to competition from, say, your neighbour the South Metropolitan, would not that bring down your dividend?

Witness: It might. I must mention that we also sacrificed something in 1860. We had the power of paying back dividend, and as we had been ten years without any dividend at all, we might have kept up our price to 4s. 6d. to the present day, and have paid those back dividends. Then we gave it up, and it was limited to six years; but we have done more than that, we have never paid back dividends at all. We do not object to being put under regulations so far as they are embodied in the Act of 1860, because they leave a considerable amount of latitude; but I think the regulations imposed on the Chartered and Imperial Companies are too stringent. They are compelled, the moment they advance beyond a price which experience has shown to be the lowest at which they can work to pay their dividend, to go through the expensive and irritating process of revision.

The CHAIRMAN: The present bill seeks to get rid of the Act of 1868, and, in place of revision, to put in another principle, which is, that you should be tempted to get a larger profit by lowering the price, and that you should not be tempted to raise the price, because you would get less profit. Why do you object to that?

Witness: Because it is an infringement of the principle upon which the whole of our capital has been raised since 1860; and, if that principle is infringed, the Metropolitan Board may come and start a fresh theory this year, and next year they may say we will have a third principle.

The CHAIRMAN: I want to know exactly upon what ground you interpret the Act of Parliament, which says you are not to earn more than a certain dividend, and not to charge more than a certain price, as giving you a right, under all circumstances, to earn that dividend?

Witness: The Act of Parliament imposed the duties, and fixed the maximum price; we have kept below the maximum price, and, therefore, we are entitled to have the maximum dividend.

The CHAIRMAN: That is the link, and I want to know exactly how it is supplied. Parliament says you are not to charge more than a certain sum, and that you are not to earn more than a certain dividend; how does it give you the right, under all circumstances, to earn that dividend?

Witness: Having limited that dividend, it rather implies that we are entitled to have the maximum if we can earn it.

The CHAIRMAN: When you speak of it as a principle which you would not allow to be infringed, is it not a principle which is an inference from something, rather than an actual practical statement?

Witness: It is an inference which the public have supported to the extent of many millions of capital, invested in the companies; and, if you ask the shareholders, they would tell you that that was the distinct understanding on which they did invest their money.

The CHAIRMAN: What do you think would be the practical effect of your being tempted, on the one hand, to lower the price, and being prevented from charging a higher price by the fear of losing your dividend?

Witness: It would give an element of uncertainty to our property altogether.

The CHAIRMAN: You suppose two things—first, that the Metropolitan Board and their constituents would not consider that the advantage of getting a lower price more than compensated any unpleasant feeling they might have in seeing you pay 10 per cent., and you also suppose that Parliament would support them in that view; but, supposing those two things do not happen, how do you think it would work?

Witness: I do not believe Parliament would support them in their view, but I can say that our whole experience of the Metropolitan Board shows a constant agitation and a constant attack upon our property.

The CHAIRMAN: The only ground you give me for thinking it would not work is that you think the Metropolitan Board would try to break the agreement; not that you think you would not be able to earn more than 10 per cent.?

Witness: I do not think we could earn more.

The CHAIRMAN: Has it not been shown that the prices, taking 10 years together, have constantly gone down?

Witness: Hardly, I think. That involves us in a very difficult question as to the value of products and various things of that sort.

The CHAIRMAN: You were at one time charging 6s. to your customers, and getting no dividend. Now you charge 4s., and get your 10 per cent., and your 6 and 7½ per cent.; do not you think it is very probable that you would be able to charge 3s. at some future time, and still get your dividend?

Witness: I am certain, if that happy time comes, the public will get the benefit of it quite as soon, and sooner, than if we had any sliding scale.

By the CHAIRMAN: We look forward to having to expend more capital as our business increases. Supposing we required £100,000, and could raise it, as in the past, at 7½ per cent. or 6 per cent. preference, I suppose that would be a boon to the shareholders, but it would depend upon how we could float it.

The CHAIRMAN: Supposing the sliding scale to be adopted, would it be an advantage or not to your shareholders to raise the capital on the lowest possible terms—say by loan at 5 or 4½ per cent.?

Witness: Certainly.

Mr. BRISTOWE: You said you liked the Act of 1860 because of the freedom of manufacture, and so on; but that may be carried to the extent of putting an end to the Act altogether, and leaving you entirely free, and then you could have competition again?

Witness: I should not like that amount of free trade. I am perfectly willing to be under certain regulations.

Mr. BIRLEY: I have here a table of the result of the Manchester working for twelve years, and I find they have reduced their price from 4s. down to 3s. 2d., with the exception of 1873, when they raised it to 3s. 4d., and the latter part of 1874 to 3s. 8d., still being below the price of 1862; and yet you will observe their surplus profits have materially increased, almost year by year, during that period.

Witness: I am afraid that would involve my going into the whole question of

the cost of coals, materials, and labour, for which I do not think they have had to pay in anything like the same proportion; nor am I aware about their residual products, and all that will influence this question. They seem to have kept on lowering their price, much as we did, till they brought it down to 3s. 2d. I do not know that that compares favourably with our 3s. 9d., considering the enormous cost of coal in London compared with Manchester. We have no depreciation account, nor any valuation of our property. We maintain our dividends and the whole thing out of income. The increase in the production of gas at our works during the past six months has been at the rate of 9 per cent. per annum; but during the depression a few years ago it fell off very much. We anticipate about 6 per cent. increase in future years. Our district has scope for extending the distribution of gas. The lower part, by Fulham, and the part on the southern bank of the river, by Battersea Park, are districts likely to increase. At the present moment our works are quite competent not only to maintain the present business, but to enlarge it very much, and that will account to a certain extent for the comparatively high rate of capital per ton of coal carbonized.

Sir *George Elliot*, M.P., examined by Sir E. BECKETT.

I am a large coalowner and a mining engineer, and have been in the habit of supplying coal to the London gas companies, and many others, for the last 30 or 35 years. I sat on the select committee of the House of Commons on coal in 1873, and also gave evidence before it. In my evidence I said there was a remarkable uniformity in the price of gas coal, and that for a period of 30 years, up to 1870, that kind of coal had been less affected than any other. After 1870, circumstances arose which caused a great increase in the price of coal, not especially gas coal, but all kinds of coal. I think it was a very bold statement for Mr. Stevenson to make, to predict that the price of coal will never be higher than it is at present. It is certain that it will fluctuate, probably not so much as it did in 1872 and 1873, but the price of coal, especially gas coal, will be very much influenced by the manufacture of iron. I have such an apprehension of the possible rise, that I should decline to contract at present prices for more than the present year. During this very week I refused to enter into a contract for 100,000 tons extending over 1876 because of that apprehension. I suffered a loss of over £50,000 from my contracts during the years 1872, 1873, and 1874. Looking to the future, I think it very unfair to tie the gas companies down to a definite price for gas, unless it is a good high price. The contracts I have entered into this year with the London gas companies, speaking as a coalowner, are not remunerative, I have often thought, and frequently stated, that the coalowners are very great fools for making contracts with the gas companies at all, because we could have our own price when coal is scarce. I have disapproved of the system of contracting, because, if we were not to do it, when the gas companies come down almost begging and praying for coals beyond their contracts in time of difficulty, we might, as coalowners, make much better terms outside the contract than we do now. The gas people generally manage to select the most depressed time of the year to make their contracts; they apply to the coalowners in the spring, when prices are generally lower than at any other time of the year. The gas companies beg and bother about 1½d. a ton just as hard as if their lives depended upon it. I remember having a long discussion in 1871 or 1872 with the board of the Imperial Gas Company; we split upon 3d. a ton, and I went away, and would not yield, but they sent their manager after me to split the difference of the 3d., and I regret that I did it, for it was a very bad bargain, and I lost a great deal of money by it. I have carefully considered the operation of the proposed sliding scale, and the opinion I have formed is a deliberate one, seeing the application of that principle is not spread over a number of years, but is to have its operation in one year, and having the strongest conviction that there are so many circumstances which may influence the price of coal. If I had to give an opinion as a gas shareholder, I should say the chances of any advantage are very inadequate, compared with the risk I should run of depreciating the value of my shares. There are 40 million tons of coal used annually when the iron trade is in operation for iron, and that 40 million tons is not made up out of the general product of coals of the country—for example, the South Wales steam coal forms no part of it—but it is the bituminous portion. All gas coal is capable of making coke, and therefore the activity of the iron trade interferes more especially with gas coals than it does with steam coals, or perhaps with any other. Consequently, so large a proportion as 40 million tons is far more than 50 per cent., if you withdraw the steam coals, of the whole produce of the country. A difference between the activity which we remember we had in the iron trade of 1872 and 1873, and portions of 1874, as compared with what we now have, will account for the low price of gas coal at this moment in some degree; and if we begin, as I hope we shall very soon, to have better times, I think the chances are that we shall have a very much enhanced price. I do not believe it is likely, on the other hand, that we are going to get any great abatement of wages from the workmen. I think they are sufficiently disciplined (I am not complaining of it in making this observation) to take good care that they are not unduly deprived of the wages which they consider themselves fairly entitled to; and then, as a coalowner, I am not getting a fair remuneration for the capital I have laid out. Taking the wages, the capital, and the freights, they are as low now as ever I remember them in London; and putting all these things together, if the price which you now have is to be the initial price, then I say, in the most earnest manner, that the chances for the dividends being increased are much less than the chances for their being decreased. I always understood the principle for which the gas companies contend to be, that their dividends are really secured to them, and I do not think they could be more convinced by any Act of Parliament that further security would be given them by the sliding scale than they possess under their present Act.

Sir E. BECKETT: It has been suggested rather faintly that this opportunity ought to be taken to increase the illuminating power of common gas. What is your opinion upon that?

Witness: I believe to increase the illuminating power would oblige the companies to use a larger quantity of cannel coal, and that coal is rather expensive, and is very limited in its area of quantity. I would rather be disposed to say that you had better have more gas, because I do not see how you are going to get more light unless you get more cannel coal; and as that coal is limited in its area, it would not appear to me desirable that you should stipulate for that which it would be so difficult to obtain.

Cross-examined by Mr. CRIPPS: I know something about the coals required for the manufacture of gas, because I sell about 500,000 tons a year. To supply 16-candle gas, tested in the way proposed by the present bill, would require from 5 to 8 per cent. of cannel.

The CHAIRMAN: Have you looked at the particular position in which these companies are, as trading companies, with regard to their dividend? Do you imagine the fact to be as the companies state it, that they consider themselves practically to be guaranteed 10 per cent. upon their original capital, and not to be able to earn more.

Witness: My impression is that it was stated to Mr. Cardwell's committee that the companies, in consideration of producing gas of a certain quality, and so on, were to have a certain reserve, and were to have paid to them 10 per cent. upon their then capital. I think afterwards they could raise capital at a lower rate.

The CHAIRMAN: Now compare their position with men like yourself—large producers on a private scale—do you think that if you were in the position of being secured 10 per cent., and not being able to earn more, that you would be likely to put the same amount of energy and activity in the conduct of your business as you have now, when everything depends upon your own action?

Witness: That is a very pertinent question, I admit, but I understand that there is a power on the part of the public to have an investigation to see that they do perform their duties in the proper way, and if they can produce the gas for less money, then they are bound to reduce the price.

The CHAIRMAN: If you were secured 10 per cent. on the one hand, and could not earn more than 10 per cent. on the other, and that the check was that three very respectable gentlemen, the head of them a barrister, were to come down and inquire whether you had conducted your business satisfactorily, do you think that you would stand at all in the place of the stimulus of your earnings depending upon your work?

Witness: My answer would be that 10 per cent. is placed there as something to be aimed at and to be obtained, and if you do not do your work properly, and if a man like the present chairman of this committee has an opportunity of going and forming a judgment on the matter, I should consider their 10 per cent. would be very much endangered unless they did do it properly, and if they made more than 10 per cent. he would take care that the price of gas was reduced in the following year. I have had transactions with the gas companies for years, and a more hard and uncompromising set of people to do business with I never met in my life.

The CHAIRMAN: Take the mere matter, of contracts, do you think that if you in your business were perfectly sure that you would get your 10 per cent., whatever was your contract, whether a wise one or not a wise one, and that you could not get more than 10 per cent., do you think you would take quite as much care about your contracts as you do at this moment?

Witness: I think I should do what I had to do conscientiously. I can only measure what I should do by what the gas companies do; they try to make the hardest bargain they can. I will give further proof. They were in the habit of contracting with me for three, four, or five years, but when they got into 1872, and the prices went up, they wanted their contracts for six months and 12 months at the outside, and we could not get any long contracts with any of them.

The CHAIRMAN: As regards your expectation about the future price of coal, I gather that you think the chances are that it will rise rather than fall.

Witness: I think it possible that wages during the next few years may not be very much higher; but the demand for gas coal in particular seems to me to rest upon so narrow a basis, from being unfringed upon by the iron trade, that if the iron trade becomes active and lively, without very much increase of wages to the workmen, the persons owning gas coal collieries—and I for one—would be very ready to put my hand down and say, "Let us have a good large price out of the gas companies; now is our opportunity." I think that is very likely to happen, and I do not know any coal that is more in danger. The price of gas coal from 1840 to 1870 did not vary more than from 6d. to 9d. a ton. The fall in the price of gas while coal remained stationary was due to the larger consumption.

The CHAIRMAN: One or two of the witnesses have stated as a reason why they think they ought to have a high dividend, that there is some degree of uncertainty as to whether gas will continue to be the great lighting power. Do you accept that view of the matter or not?

Witness: When I was a boy we used to think that gaslight could be made out of water and out of the sea, and no doubt light can be abstracted out of other things besides coal; but the inventions which have been from time to time produced have turned out to be practically nothing more than toys, and I should not be afraid of my dividend so much in reference to that as in reference to the alteration to the sliding scale.

Mr. TALBOT: Why are you so afraid of the sliding scale as regards the gas companies?

Witness: If I understand correctly, the sliding scale is to be taken year by year; but if there was an average it would be less objectionable. You might have a year like 1873. Supposing there were a great strike of the men engaged by the gas companies, or that gas coal goes up 8s. or 10s., then you knock down the dividend because of the high price of coal, but you have not an average; it must be year by year.

Mr. TALBOT: As your dividend goes down, your price goes up?

Witness: As I understand, you begin with 3s. 9d., and for every penny you go up you lose ¼ per cent. dividend. I know that the price of gas was raised to 4s. 8d. once, and should that happen again, it would be an increase of 11d., or 2¾ per cent., which would reduce the 7 per cent. dividend to 4¼ per cent.

Mr. TALBOT: I am not speaking of the original shareholders, who may be supposed to hold a parliamentary guarantee for their 10 per cent.; but is it not fair that, looking to the future, the consumers and the producers should share the losses as well as the gains amongst them?

Witness: I have been speaking about the vested interests of people; but if your question refers to the raising of new capital, and how it should be dealt with, it would receive a different consideration from me.

Mr. *Charles Mark Palmer*, M.P., examined by Mr. RICHARDS.

I am one of the members for North Durham. Myself and my two partners produce about 25,000 to 30,000 tons of coal a week, and about a quarter or more of that is gas coal. Looking at the past and present state of things, it is very difficult to predict for any length of time what the price of coal may be. My fear is that it will not advance for the next year or two. Seeing that the price of iron is falling, and the stocks of iron in the country are accumulating, it can only result in blowing out the furnaces, which will re-act upon the coal trade, and certainly not tend to advance the prices. I agree with Sir George Elliot that a revival of the iron trade might reasonably be expected to have an effect on the price of coal. The iron trade, when once it recovers, soon takes up the supply of coal. The labour market becomes in each of those periods more difficult and more restricted in consequence of the working of the men; as their wages advance they work less coal, and the difficulty is to produce more to meet the increasing demand at those different periods.

Mr. RICHARDS: Without tying you down to a prophecy, do you see any reason whatever why the circumstances which occasioned the great rise in the price of coal in 1872, 1873, and in the early part of 1874, may not occur again in the course of the next few years?

Witness: I should not be sorry, but I much doubt the fact that they will do so. I fancy that it is a most exceptional thing. After having been in the trade for a great number of years, I never could have contemplated the rise. In connexion with the great demand for coal from the iron trade, which was somewhat exceptional in itself, the Coal Mines Regulation Act was passed, which very considerably reduced the production of coal from the mines; so that, the two things coming into operation together, had a very material effect at that time in causing the extra advance. As a large iron maker I have had a great deal to do with sliding scales, in the wages of the iron workers, and there are periods when we find those sliding scales quite inoperative.

Cross-examined by Mr. PHILBRICK: I think the price of coal may probably have a tendency downwards, but it depends entirely upon the iron trade. In my opinion gas coal is not influenced to the same extent as other manufacturing coal. We find the demand for gas coal very steady, whereas the other class of manufacturing coal has suffered a greater reduction.

Mr. BIRLEY: How much do you think the Mines Regulation Act has added, taking it roughly, to the cost of raising coal per ton?

Witness: Much will depend upon the collieries. In deep collieries, where we have what is called a large number of off-hand men, and only a limited power of raising a quantity of coal, the cost in the production is very great from the limitation in the ability to get the coals to the shaft in the first place, and that limitation of quantity having to be also put upon a very much larger number

of people. I believe the Act has increased the cost of producing the coal certainly from 1s. 6d. to 3s.

Mr. *Robert Morton*, examined by Mr. RICHARDS.

I am engineer-in-chief to the London Gas Company and control all the details of the manufacture at Nine Elms station. When any extension of works is required I point them out to the directors, who give their sanction, and the work is carried out. All possible care and management are exercised in the conduct of our affairs. With regard to the coal supplied to our works, we communicate with the coalowners, and we ascertain what other companies are doing, and what they pay for coal, and we buy our coal at the cheapest rate. I have a familiar knowledge of coals and the way to get at them, and how to deal with them. We analyze each individual coal ourselves. We have a short dock from the river, about 300 feet in length, in which we barge a large proportion of our coke. We are obliged to send it away, not having a sufficient market near the works, although we sell as much in the immediate neighbourhood as we can. We never stack it if it can be avoided. There is very little difference between us and the South Metropolitan as regards coke. Our wages were ·75d. above the average in 1873, but I think we deal a little more liberally with our men than some of the other companies. We do not get quite the same amount of work out of the men for the same amount of money paid away for the number of retorts the men are required to work. I do not think it possible to keep the amounts of the company more accurately, or work more economically.

Mr. PHILBRICK said he had no question to ask this witness.

Mr. RICHARDS said he had not exhausted the evidence, but he had taken the companies which might be considered the largest and the principal, and he thought the committee had heard enough to give them a thorough insight into the position of affairs. He had witnesses from the remaining companies in attendance if the other side wished to ask them any questions.

Mr. CRIPPS said he did not desire to see them.

Mr. RICHARDS said he had a table to put in, showing the metropolitan and provincial gas companies and local authorities that advanced the price of gas in the year 1873, with the amount of increase in each case, and he would call a witness to prove the same.

Mr. *W. B. King*, examined by the CHAIRMAN.

I am publisher of the JOURNAL OF GAS LIGHTING. I produce a list of metropolitan, provincial, Scotch, and Irish gas companies, and of local authorities, that advanced the price of gas in the year 1873, showing the amount of increase in each case. It does not include the whole of the companies and local authorities by whom advances were made, but only those from whom I obtained a direct return. I had returns from about 800 companies, and of these, advances had been made by six metropolitan, 293 provincial, Scotch, and Irish companies and 41 local authorities who are the owners of gas-works. [Table handed in.] In some of these cases reductions have since been made, but no reductions were made during 1873.

Mr. RICHARDS said that was the case for the associated companies.

Mr. POPE, on behalf of the Commercial and Ratcliff Companies, expressed the willingness of these companies to voluntarily submit to the general conditions and regulations which the Board of Works thought desirable to submit to the committee. He therefore thought it more respectful to the committee and fairer to the associated companies, and in good faith with the Metropolitan Board, that he should stand aside from the present discussion, and reserve the expression of his views, and what the companies were willing voluntarily to assume as their duty, until the discussion on the Commercial Company's bill.

MONDAY, JUNE 21.

Serjeant SARGOOD said it was now his duty to address the committee on behalf of the Chartered Company, and he must say that of whatever importance this inquiry might be to the consumers of gas in the metropolis—and upon that subject he should have by-and-by to say a few words—it was of very much more importance to those large commercial undertakings represented by the nine metropolitan companies now supplying gas. All agitation of this description must inevitably be detrimental to them to a greater or a lesser degree; all uncertainty as to the principles upon which they were to conduct their business, all uncertainty as to the regulations by which they were to be governed, must more or less affect them detrimentally; and, therefore, though the gas agitation might be to some men a medium of power, might be a species of occupation by which certain individuals were kept prominently before the public, as Mr. Beal formerly was, yet when it was found that there was an utter absence of consumers with any individual grievances, but that this agitation had been got up by public bodies, and when it was found, after three years deliberation, the well-devised scheme of Mr. Cardwell, embodying not alone principles, but embodying most minute regulations, was now declared, even by those who invented it, to be a thing distasteful to themselves, it showed at least, he thought, how careful the committee should be to ponder on the edge of any proposed altered legislation, and not rush into acceptance of propositions from men who periodically came to Parliament to disturb the existing state of things, and, however well the companies might adhere to the principles and practices laid down from time to time, were always coming to Parliament, the moment the companies were sliding into prosperity, to ask that something might be done to place that prosperity in jeopardy. In the present year this experiment had been tried on a very large scale, because not only was there the bill now before the committee, but there had been two other bills launched into Parliament, and suddenly withdrawn—one threatening competition by establishing new works, the other threatening absorption by a proposal to buy up the companies. He need not say that the commercial interests of great companies of this description were threatened and imperilled by proposed changes of this description, and he could well understand that, if there was any *bonâ fide* idea of buying up the whole metropolitan companies, the threat of a competitive bill for establishing works on the one hand, and the threat of new and more stringent arrangements on the other, would be a pretty effective lever in the hands of consumers as a preparatory blow to ascertaining the price at which the companies were to be bought. He had already said that the proposed changes affected nine companies, and the capital employed by them in 1873 was £10,163,873. A very large part of that capital was held for the benefit of clergymen, retired officers, widows, and orphans, all of whose interests were committed to the care of the directors of these companies; and that was an object which the committee ought not to lose sight of when considering how far people were affected by violent changes like these.

The CHAIRMAN: Upon that matter, can you speak to the fact of how far trust-deeds, settlements, and so forth, allow investments in gas companies?

Serjeant SARGOOD: No, I cannot say that I can give it in satisfactory proportions; but it is well known that there is a very large amount of gas stock held under those circumstances.

The CHAIRMAN: Under settlements?

Serjeant SARGOOD: Under settlements and as investments. I am told by Mr. Baxter that he does not remember the particular direction to invest in gas shares, but the power to invest in any joint-stock company incorporated under Act of Parliament is a very ordinary thing in settlements, and under that there would be the power to invest in gas shares.

Mr. BRISTOWE: Not usually ordinary stock, but in the shape of debenture stock or preferential stock.

Serjeant SARGOOD said he thought the honourable member was right in saying that. At the same time, they knew of their own knowledge that a very large amount was held by clergymen, by retired officers who had small amounts to invest, and by the widows of those who were deceased, and therefore their interests were matters that the directors were bound very carefully to consider and look after. And though he did not say they were here only for the purpose of protecting their interest, yet he was sure the committee would see that they did not suffer needlessly. Now, the Chartered Gas Company, if they were the only gas company in the metropolis, would be entitled to their serious consideration on account of the large amount of capital they had invested in the undertaking. On the 1st of January, 1875, their share capital was £3,150,000, and their loan capital £813,500. They had yet the power of raising share capital to the extent of £1,000,000, and loan capital to the extent of £250,000, so that the total amount of capital authorized by Parliament in this one company was £5,213,500. The Chartered Company were the first, and he might say the only pupils of Mr. Cardwell's Act of 1868. They adopted and took up in its integrity the whole of the legislation of 1868, the result of three years most arduous labour and investigation of the parliamentary committee who sat upon it. While for one moment he would not be supposed to underrate either the intelligence or the industry of the committee whom he had now the honour to address, he was sure they would forgive him for reminding them that the legislation of 1868 was the result of three years labour, and that in two years out of the three they had almost the same committee sitting upon it; certainly in two years presided over by Mr. Cardwell himself. And he ventured to say that Mr. Cardwell took as great pains, and showed as much patience and industry in that investigation, as the present committee had kindly given to it during the long inquiry of this year. The City Gas Act of 1868 had a peculiarity in its history, which had cropped out in the course of the inquiry. It was intended to be a Metropolis Gas Act for the amendment of the Act of 1860, and but for the fact that Mr. Cardwell could not force legislation upon the companies at that moment, for the reasons he gave, it would have been in its integrity a Metropolis Gas Act, to which all the companies now appearing would have become subject. The peculiarity of the circumstances at last drifted the matter into this shape — that the Chartered, being the only company who stood in danger and peril through avoiding the Act, were compelled, while all the other companies retired, to bend their back to the burden; and the only question with reference to that company would be whether, having done so, they had acted loyally and honestly in carrying out the principles by which they undertook voluntarily to be governed. The Chartered Company being at work in the City with two other companies, undertook that the Act of 1868 should be made applicable to the whole of the district served by the three companies, and it was re-christened in committee as the City of London Gas Act, in order to adapt it to that particular view. But, at the same time, the idea of its being a metropolis Act was not lost sight of; and the Chartered, who were the only one of the three having a district outside the City, by a clause put into their own private local bill, made that Act of Parliament applicable to so much of the metropolis as they were then serving, and at the same time entered into the spirit of amalgamation, and carried it out to the best of their ability, having made it applicable to so much of the extra part of the metropolis as came into their jurisdiction by means of the amalgamations they subsequently made. And every inch of ground which the Chartered Company might hereafter cover by means of their future amalgamations would be brought under the provisions of that Act. So that if they supposed for a moment that it was a good Act and did not want altering, the engine for applying it to the whole metropolis was the action of the Chartered Company. Now, with reference to past legislation, he would not weary the committee by going again over the ground that Mr. Cripps had gone over but he should have occasion to refer from time to time to past legislation, in order to contrast it with the present. He would at once proceed to what was really the business of the committee—*i.e.*, the consideration of the present bill. How far was the bill justified either by the speech of his learned friend or by the evidence that he had produced? The Chartered Company having given in to the legislation of 1868, and having thereby abandoned the legislation of 1860, except to the extent to which it was left untouched, were in honour bound to stand by the legislation of 1868, while all the other companies who had not yet accepted that legislation were fully entitled to fight for the old ideas of 1860. The Chartered Company could not consistently do it, and more than that, they did not desire to do so. They desired to stand by it, and show their allegiance to that which they undertook. What they were anxious to produce upon the mind of the committee was an impression that the 1868 legislation was good and effective for its purpose, and that no cause had been shown to induce them to change it. Now, what was the issue they were invited to try by his learned friend? In his opening speech he said: "Experience proves that the present regulations are not sufficient, and that is the issue to be tried." So that the committee had a very narrow basis before them, laid by the promoters of the bill themselves. It was not as though this matter were referred to them for the purpose of making a report with anything like instructions upon the heads upon which they might make it, though they might think it convenient to make one of their own motion. They were sitting by the invitation of the promoters, but for the existence of whose bill their time would not have been occupied in any inquiry of this sort. Therefore the narrow issue which his learned friend raised, and which he said was the issue which they had to try, was that experience had shown that the present regulations were insufficient. Now, who raised this issue? The Metropolitan Board of Works and the Corporation of the City of London; the very people who invented the bill of 1868, who succeeded in forcing it upon the Chartered Company, and who, by their petitions in the other House, insisted that it was such a good bill that it ought not to be altered. That being so, just see the direction which his learned friend, Mr. Cripps, gave. He was desiring to make a change, and he (Serjeant Sargood) agreed with him in this observation, that "the onus was upon those who sought the change, to show its necessity." That was the text upon which his learned friend chose to speak, and the question was whether or not they had shown any necessity for any one of the changes introduced by this bill, so far as they were changes. In order to test the promoters idea of the insufficiency of existing legislation, let them see in what manner these inefficient regulations were to be affected by the bill; and for that purpose he referred to the bill itself, and to the Act of 1868. His learned friend denounced the Act of 1868 as obsolete, in the question he put to Mr. Stevenson, and he denounced it as useless and futile; and yet it was a very remarkable thing that the present bill was founded upon the two ideas of repealing the Act of 1860 and re-tinkering the Act of 1868. How far did the bill affect to make changes under the plea of saying that they were necessary? By clause 6, cannel gas was to have a fixed price, with an illuminating power of 20 candles. By the obsolete Act of 1860, cannel gas had a fixed price, with an illuminating power of 20 candles. By Mr. Cardwell's legislation, cannel gas had a varying price according to its illuminating power, in reference to which no specification or limit was given; so that the first step was that, while Mr. Cardwell allowed cannel gas to vary with a varying price, the promoters went back to the obsolete legislation of 1860, without the fixed price, with the 20-candle illuminating power. No reason was given for this in the speech, and no reason was adduced for it in the evidence. He would take another subject—namely, the referees. By clause 9 of the bill there were to be three referees. There had always been three, but the bill said that the Board of Trade should appoint one, the Corporation and the Metropolitan Board of Works another, and the companies a third. This was quite new legislation. In 1868, by the 29th section, they were all three appointed by the Board of Trade; they were to be competent, and they were to be impartial; and one of them must have practical knowledge and experience. What was the amendment of this Act? Neither of them was required to be either competent or experienced; and instead of all of them being impartial, and in the interests of the consumers, they were to be two men who were not impartial, but avowed partizans—one to represent the companies, and the other to represent the corporation and Metropolitan Board of Works; the third, he supposed, being a

sort of umpire to represent the Board of Trade, because hitherto the Board of Trade had represented the public, and now they represented nobody. Now, what was the meaning of this? Had the committee heard a reason for it in his learned friend's speech? Had they heard any evidence given in support of it? The importance of having men who were not partizans, or personally mixed up with things of this sort, was illustrated by a little incident. He would not mention names, but a gentleman who was appointed one of the gas referees was dismissed from his appointment, and the committee heard how he busied himself in turning to his own private interests the discoveries he made in the discharge of his public duty. He mentioned that to show the importance of having people of high position. Where were they now in reference to this subject? Professor Tyndall, standing at the head of inquirers into physical science; Professor Pole, a most eminent gas engineer; and Professor Vernon Harcourt, Lecturer on Chemistry at Oxford—three men, in reference to whom probably they could not make a better selection for the purpose. And what had they done, or left undone, that the committee were to say that the Board of Trade had made a bad choice, or that they had made a bad use of their opportunities in the interests of the consuming public? This was another of the changes proposed to be made without rhyme or reason, except one—that the promoters must make a bill. Paste and scissors had done it to some extent, for though the legislation of 1868 was technically repealed in words, it was positively re-enacted in terms throughout three-fifths of this bill. Section after section was repeated without a single alteration. But for the purpose of adapting the 1868 legislation unchanged to all the metropolitan companies, a single bill with a single clause would have done all that was wanted. Then as to the testing-place. By clause 20 a testing-place was to be provided in each separate district. In 1860 a great discussion took place as to the proper point for testing, and it was arranged that it should be about 1000 yards from the works. In 1868 the whole question was again very fully discussed, and the words were slightly changed in order to show how certain all parties were that that was the right place for testing, and the words were "as near as may be, but not less than, 1000 yards from the station of supply." What reasons were now given for the change? They had been told that the loss of illuminating power by travelling a distance, was a moot point about which gas engineers were at variance. Why was the testing-point, that in 1860 and in 1868, after two inquiries, was thought to be fairly fixed at 1000 yards, to be now changed? His learned friend, Mr. Cripps, gave no argument about it; he did not make it clear why the change was to take place, and he (Serjeant Sargood) ventured to say there was no evidence that warranted it. One of two things was certain. Either the illuminating power did become less at a great distance, or it did not. If it did not become less, then why change the point at which the thing was to be tested? If it did become less, then remember that the company were driven out of town down to that place at Beckton. They were compelled to go there in the interest of the metropolis, to get rid of a noisome trade from their midst. If they could make and deliver gas warranted to be 16-candle gas, tested at 1000 yards from their premises, what reason was there, practically, for altering the test point? If it did not lose power at a distance, *cadet questio*. If it did, why were the company to be mulcted into supplying a superior article at a distance, when they were driven out by force of legislation to that distance? By the Act of 1868 the company's works at Brick Lane and Curtain Road were to be shut up after a limited time. They were no longer allowed to make the gas in the neighbourhood where it was used. And in 1870, under the amalgamation scheme for the City of London, the Board of Trade might give them notice no longer to store gas in the City. By section 19 of the Act of 1872 the Lupus Street works were not to be increased; so that, notwithstanding the enormous increase in the manufacture of gas under the normal state of circumstances that they were involved in at that moment, they were driven out from their old haunts, and compelled, in the interests and health of the metropolis, to go to a distance; and there was no reason why, if the committee were satisfied that the company manufactured and delivered at 1000 yards from their premises a 16-candle gas, they should, by requiring it to be 16 candles a long way off, put the company under terms to make a higher illuminating power in their works. After all, what was the meaning of the words, "16-candle gas"? It was merely a test of a certain marketable commodity. One test was freedom from sulphur, another was freedom from something else, the third test was the number of candles illuminating power. But to a consumer, as a practical question (assuming that the literal meaning of the phrase was accepted), what difference would he find in the evening, if he sat in his study, whether he had 12 candles or 16 candles? He would hardly appreciate the difference. Of this he was sure, that, after all, 8 or 10 candles would give all the possible light that could be desired.

The CHAIRMAN: I should certainly find the 16 hotter than the 12.

Serjeant SARGOOD said there was no doubt of it; and he fancied that an Argand gas-burner of 16 candles power would be hotter than 16 candles. But the real question was this—it was not the amount of light thrown upon the paper or the property of the consumer by which he could inspect it; it was the test of a marketable commodity, and a species of assessment of its market value.

The CHAIRMAN: We are all convinced that it is merely used in the bill, and we merely use it in our consideration, as a measure.

Serjeant SARGOOD: If in 1860 and 1868 it was agreed that 1000 yards was a fair test of the value of the marketable commodity, what reason had been given for the change proposed? Literally none. Before he passed from the question of illuminating power, he wished to clear up a little difficulty into which he got himself by a precipitate observation, and if he did so, he had the courage to say he had made a mistake. As to the obligation of supplying 16-candle gas, what he meant was this—that there was no statutory obligation upon them, coupled with a penalty and enforceable by a penalty, which compelled the company to supply 16-candle gas at any hour during the hours of testing. He did not mean that there was no legal obligation upon them to give 16-candle gas. Undoubtedly the companies recognized it as an obligation—somebody said a moral obligation, but he went beyond that, and said it was a legal obligation. And therefore undoubtedly in the course of the day or night any consumer had a right to expect, when he turned on his tap, that the company were giving him an article which if tested would answer that description. He did not for a moment desire to escape from that admission; but he did desire to escape from this, that the time when gas was not ordinarily used or required by the public, should be the hour for testing and enforcing the penalty. And he thought the 1868 legislation went in the right direction, for it said this, "We impose it as a legal obligation that you are always to deliver an article of this value, but during the hours when the public are most demanding it, we will take care that it shall be enforced by the penalty if you fail." It would be very unreasonable to take any hour of the 24—one or two in the afternoon, say—to test it, and to say that the penalty should be put upon the companies for infringement during those few hours; but from five o'clock till ten, they were to be free from the penalty. If that would not be reasonable, they only reduced the unreasonableness by a small degree when they said, "You may take your test at twelve o'clock in the day as well as six o'clock in the afternoon, and again at twelve at night." It was a mere question of degree. What they had to consider was this—there being at all times the legal obligation to supply an article of a fixed illuminating power, if the penalty was to be enforced, should it be for the failure at a time when the thing was most wanted, or during the time when ordinarily it was least wanted? With regard to the discussion which arose upon Mr. Hetsch's and Mr. Young's evidence, he must either do one thing or the other; he must either attack the Corporation of the City of London and the Metropolitan Board of Works for the grossly unfair manner in which this thing was introduced, if it was intended to be introduced as a charge, or else he must acquit them both of any intention ever to have alluded to the subject; and he must say that it was by a mere piece of supererogation upon their part that Messrs. Heisch and Young interfered, and brought forward that which the promoters never intended to allude to. If they intended this, then he could find no language too strong for publicly denouncing it; and the committee would do him the favour to imagine that he had used language which he should hesitate to use in their presence, in order to show what the sense of the companies was of this covert attack made upon them. However, he was serious in saying that the companies, the Chartered Company particularly, had felt this indirect attack upon them as one of the most ungracious as well as one of the most unjust things of which the Corporation of London were capable. That they did not want to bring this forward as a charge he ought to be able to infer from the fact that his learned friend, Mr. Cripps, never hinted anything of the kind in his speech, and never suggested that they had found out anything that gave them a latent suspicion; still less did they state that they intended to prove that they believed it. But perhaps the corporation were overridden by the Metropolitan Board of Works in this way. He did not think if the Metropolitan Board of Works had not been busy in this crusade this year, that the Corporation of the City of London would have brought in a bill to amend the gas legislation of 1868. He would do them the justice to say that they were and had been led captives, at their will or against their will, by the syren charms of his learned friend, Mr. Cripps. He believed that if his learned friend, Mr. Philbrick, had invited the corporation to bring in a bill, they would not have done it; but when his clients had brought in a bill apparently in the public interest of the consumers, no doubt the Board of Works went down to the City and said: "Come, you must help us in this scheme; you must show up, and back us up in it. If you have nothing to say, give us the light of your countenance, and it may be the advantages of your purse," and the City felt that they could not very well back out of it. But where did the agitation begin? Not in the City; they heard about the Metropolitan Board of Works scheme long before the City showed its face in the matter, and he fancied he was pretty right in his judgment that the Metropolitan Board, having got up this concern, thought that their brethren in the City ought to meet them and come in to help them; and it had been by a misadventure that this sort of charge about illuminating power had been brought out. But he looked upon it as a serious charge, though they did not mean to make it, and did not come prepared to make a complaint about it. The Metropolitan Board of Works having got up the bill, what was Mr. Young employed to do? Just at the time when the notices would be given for it, Mr. Young was employed for the express purpose of casting about for some sort of evidence, and he was to be paid for his industry out of office hours in trying to find this variation in illuminating power. And though that young gentleman actually had the temerity, when in the chair, to tell him that he had no notion of what was going to be done with the information when he had obtained it, he seemed to be excessively alive to the value of it, and, to use the popular phrase, keeping it dark till the time came to spring it upon the companies; for it was sprung upon them without even an introductory speech or a hint that the charge was to be made. But he (Serjeant Sargood) would tell the committee this, and would give evidence of it. The company admitted the 16-candle obligation, and they were testing every hour during the day, and had a tell-tale watch kept upon the state of the illuminating power, to put them on their guard; and they had a record kept of the state of the gas, because they were anxious to keep it up to the due illuminating power. And the committee would have evidence from their establishment, with the figures and dates, when the young gentleman, Mr. Young, threw down the gauntlet. But they would have more than that; they would have the evidence of Dr. Whitmore, a gentleman perfectly independent of the company's works, engaged for the parish of Marylebone, and who, while testing officially in the office, or at some of the districts, was carrying on from day to day, for his own satisfaction and the satisfaction of his clients, tests, out of office hours, continuously throughout the whole of the year. He would not lessen the weight of his evidence by mentioning now what the details were. Mr. Young was incorrect, and he would only say how astonished he was, when he read Dr. Whitmore's proof, to find, during the period of five consecutive years that he had been daily testing, how very infrequently he found that the gas was below the illuminating power that it ought to be, as against the general average of a height of the illuminating power far beyond what it need be. He might tell the committee that giving 16 candles meant making 17½ candle gas. The companies could never be sure of the illuminating power, and if they were to avoid penalties, they must allow a margin well on the other side, because they had no allowance made to them for deficiency, beyond a few hours where the general average of three tests was to be taken as the ruling average of the day, and they were only to be subject to penalties when they got below that 16 candles. The next point embraced by the bill was the burner for testing. Now, what was the object of the present bill? By clause 23 it was to have the character of the burner fixed by statute. In 1868 the consumers manufactured a bill in which they left that to the referees. The referees appointed in the interest of the consumers were themselves to fix what sort of burner it should be. But the 1868 Act no longer suited those who manufactured it, and the obsolete legislation, as his learned friend called it, of 1860, was to be returned to, and they were again to have the burner fixed by statute. The committee had heard what the evidence was upon that. Mr. Stevenson, than whom, he supposed there was not a more intelligent witness, came in the interests of the consumers (and he would do him the justice to say none more fair), and said it was a matter unimportant, it was not of the slightest earthly consequence. When they started with a fixed burner in 1860, 16 candles meant a certain defined power. Another burner had been since invented that developed more light, and now they came again and said, "Do not leave it to the referees, we want it fixed by statute." As far as the companies were concerned, it was a matter of utter and entire indifference, and he only referred to it to show that they were going back to what they called the obsolete legislation of 1860, in order to fix a thing by statute which they begged to be allowed to unfix in 1868. Then he came to the testing hours. They wanted now to alter the time of testing. By clause 26, as amended, they proposed that it should be tested "three times a day, at the times that the referees think best suited, in order to ascertain that the gas is of the prescribed power," and that was to be taken as during the whole of each day. He had told the committee that the companies were always on the alert to keep it up to the right power, and, therefore, it was not of much importance to them. But what was the use of the change, and what was the real reason for it? If the penalties were only to be inflicted during the testing hours, they might make their testing during the day as much as they liked; but it would be a monstrous thing that these heavy penalties were to range over any hour of the 24, instead of being limited, as they had been by the Act of 1868, at the express desire of the consumers, to those three or five hours in the winter or summer, when it was supposed that the public were best protected by legislation. Whatever the times of the testing were, they ought to cover something like the ordinary idea of the time when there was a greater consumption of gas, and the penalty ought to be confined to those hours. He would now refer to another object of the bill—*i.e.*, the auditors under clause 44. There was a provision now made that the auditor was to inspect "as and when he thinks fit." The committee would, perhaps, wonder why he paused upon that, and say it was not objectionable. No, it was not, but it was utterly useless. By the 1868 legislation, an auditor was appointed in the interests of the consumers and against the companies, whose business it was half yearly to audit the accounts

of the company. Now, no one supposed that it meant that he was to walk in on a particular day of the half year, between the office hours of ten and four, and audit the accounts of this company, because it would be a simple impossibility. Mr. Parkes, who was the auditor on behalf of the public against the companies, went into their office on any day of the year he liked, and at any time, and took any book he chose, and called for any papers he wanted, within the very words of the Act, "as and when he thinks fit," and that was the way he conducted his audit. He had the entire control over their books; he had the power to stay the dividend until the books were put in, or any account he disapproved of was put into the shape he wished. And, remember, Mr. Parkes was the representative of the consuming public; in this matter he acts as against the companies, and they were given the right of appeal if they were dissatisfied, evidently showing that he was their antagonist, and not their ally. By clause 44 of this bill, he who had the power to suspend the dividend until the books were made to suit his purpose, had very great powers accorded to him; he actually was empowered by the consumers to grant the companies a conditional certificate for dividend. At present there could be no dividend until the accounts were certified, but hereafter he was to have the power of granting a conditional certificate. The companies had never asked for it, they did not want it; they were perfectly content that the strong, imperative power of the 68th clause should remain upon their shoulders, and that their dividend should stand impeached until the auditor was satisfied with the books. They wanted no conditional certificate given to them. This was a sort of sop in the pan to say, "See how fair we are, see how considerate we are to the companies. We abide by the 1868 legislation: we hold ourselves responsible to that audit, and we do not shrink from it." What reason was there for any change? None whatever. None given, and none suggested. Again, by clause 45, the Corporation and the Metropolitan Board of Works, as well as the auditor, were to investigate the books and audit the accounts. The companies were to have new auditors. Under the 82nd clause of the Act of 1868, the auditor alone discharged this duty. Had he failed in his duty? Had Mr. Parkes's judgment ever been impeached? He was appointed by the Board of Trade, in the interests of the consumers, to take care that things were not carried to the wrong accounts to their detriment; to take care that nothing was put against capital on which they paid a dividend which ought to be charged to revenue, to be paid out of the price of the gas at the risk of the dividend. If he was there to audit in the interests of these people, why were the companies to be entangled in discussion with them, and have them coming in to overhaul books and to raise difficulties, ill-feeling, and discontent, where in the presence of such a man as Mr. Parkes, a disinterested auditor, nothing of the kind had ever occurred? In other words, they were asking this extreme folly, that the Metropolitan Board and the Corporation, who were the representatives of the gas-consuming public, were to be their own auditors, to assist Mr. Parkes in auditing for them! He trusted, if the committee did nothing else with the bill, they would blot out from it such a clause as this, which was only calculated to sow seeds of discontent and discomfort where hitherto there had been peace and harmony. And then, in order to be consistent with all this, look at the inconsistency of the 47th clause. At the present moment, the auditor having audited on behalf of the consuming public, the company, if they were dissatisfied, might go to arbitration. But what did these people ask? That they might go in and audit for themselves, arm-in-arm with Mr. Parkes, and then claim arbitration against the result of that audit. Could anything be more inconsistent? First they were to do the work themselves, and then go to arbitration if they did not like the result. By the 45th clause they wanted to have a finger in the pie, and by the 47th clause they wanted to express their dissatisfaction with it when they had made it. The present state of things was simplicity itself. In the interest of the shareholders, the Board of Trade appointed a public auditor; if the company did not like the result of his dictum or dicta, as the case might be, they might appeal, but if they thought that which he did was reasonable in the interests of the public, and unobjectionable, they were quiescent. They never had had occasion to find fault with Mr. Parkes, and they had altered their books of accounts wherever and whenever he had required them to do so. If Mr. Parkes had come to tell the committee that he wanted a change, there might be some reason for asking it. If they had put a single witness into the box to show that Mr. Parkes was an inefficient man, there might be some reason for saying, "Let us go and help him." But, of all things in the world, to send in the Metropolitan Board accountant, and the accountant of the corporation, to audit the companies accounts, in conjunction with Mr. Parkes, was one of the most absurd propositions he ever saw, except the following one, namely, that they might appeal against their own decision if they did not like it. There was no default alleged, and there was no doubt that any alteration such as this would only promote litigation instead of avoiding it, as the present system did. He now passed on to review a few other clauses in the bill, and see whether they were wanted. By clause 6 in the bill the price was 3s. 9d., with a sliding scale at the option of the company, and, in the first instance, it was only intended to slide upwards. By the Act of 1868 the consumers insisted on 3s. 9d. as a price, changeable only by means of the Revision Commissioners; the obsolete legislation of 1860 was a fixed price, changeable by the company on notice, unless challenged by the consumers. By this bill the illuminating power was put at 16 candles; by the repealed Act of 1868 the illuminating power was put at 16 candles; by this bill the maximum dividend was 10 per cent.; by the legislation of 1868 the maximum dividend was 10 per cent.; by this bill the insurance-fund was 5 per cent. upon the paid-up capital; by the legislation of 1868 the insurance-fund was 5 per cent. upon the paid-up capital. So far there was but little change, even where it did occur, and no change in many other things, and he wanted to know what all the agitation was about. Who set it in motion? There was no evidence as to what had provoked it? He must look to his learned friend, Mr. Cripps, to argue the question. He returned to his learned friend's speech, and there he found a reply to the whole matter in plain words. After talking about a great many subjects, his learned friend said this: "But the essential point of the bill is clause 6, and what follows upon it, the illuminating power raised to 16-candle gas, and the excision and alteration entirely of the revision clauses." Now they had got to the bottom of the whole matter; after all this paste and scissors work, they at last found out what the real object of this was. They were told that clause 6, with its fluctuating dividend instead of its fixed maximum, and the excision of the revision clauses, the only protection to the company, were the essential parts of the bill. The committee would always remember that the 1868 bill was a consumers bill; from end to end of that bill, everything that was introduced was a weapon of oppression against the companies. He used these words strongly, but only figuratively; he did not complain of it because he had adopted it; therefore it must not be imagined that he spoke of it in a complaining tone; every provision in that bill was oppressive upon the companies; the 68th clause, which gave to consumers the right of applying to reduce the 3s. 9d., was a clause that no one had the face to introduce as a single-edged sword; they were compelled to sharpen both sides of it, or there would not have been one vestige of fairness in the whole of that bill, as regarded the companies themselves. The consumers thought they had got hold of the handle, that it could never be used against them. They admitted that both edges were sharpened. Did they conscientiously, when they tendered a weapon of that sort for the joint use of the parties, know what they were about? What did Mr. Newton say? Mr. Newton told them this: "The whole of Lord Cardwell's report in adopting revision was to enable the price to go down, but he never contemplated its going up." Now he (Serjeant Sargood) did Lord Cardwell much greater justice than to believe that; but as Mr. Newton was the propounder of the theory, he would believe him. No doubt the consumers, when they said, "There is a two-edged sword, equally fair to each of us," did think, "Ah! that is a specious way of introducing it; they cannot very well object to it when we describe it in that way, but we will take good care to have hold of the handle ourselves." Well, he admitted that neither they nor the companies anticipated the prices of 1874; but the obvious intention of the clause when determined upon by Lord Cardwell was this, that it should be of mutual use; that it should be as fair to one party as the other; that if things went down, the companies could be compelled to reduce their price, that if things went up, they might be entitled to raise their price; but under each state of circumstances one problem had to be worked out—that was, that the price was to be the leverage by which they were to obtain the 10 per cent. dividend. But as soon as the consumers found, and not till then, that the handle really was one that the companies could grasp, and the weapon one they could use, without any question of fairness or propriety, or anything else, the outcry was, "Down with the revision" (and, as my learned friend said, the essential part of the bill was the excision of the revision clauses); so that the only advantage the companies received in return for adopting the obligations of that Act the committee were now asked to wrench back from them, giving them nothing in return, except increasing the weight of the burden which for that price they voluntarily undertook. And it must be remembered it was a burden that even Mr. Cardwell himself said that he would never force upon their shoulders against their will. The City made their bargain with them, and he said it was discreditable to the City of London that, in the teeth of that deliberate bargain, from which the companies had never flinched, and which they had conscientiously carried out, the moment they saw the slightest ray of sunlight fall upon these companies, and that the Act was an Act calculated to work justice to the one side as well as the other, they joined in this crusade of the Metropolitan Board of Works, and tried to wrench from their grasp even the possibility of the little advantage which they had by the one solitary clause that attempted to do them justice. Mr. Cardwell was said never to have thought that this up-and-down revision could go in any way except in one direction. What a very remarkable thing it was that, while the consumers fancied that the revision business was only intended to aim at the price going down, the new clause in their bill itself took the converse view, and provided only for the price being put up; and then they had appended to it the up-and-down scale, which was a monstrously inconvenient thing, and upon which he would have to enlarge hereafter. They had been shamed into a change of that sixth clause. Any bid for the bill; and the Board of Trade having suggested that fairness necessarily involved a view of both sides of a given question, they at last reluctantly said, "Well, we know our own obliquity of vision; we are never able to look at things fairly and dispassionately; we will give way to the Board of Trade." They said that Mr. Cardwell, when he looked up and down, only intended to look one way; they came in themselves only looking one way, and they had now adopted a provision looking both ways at once, but it was a thing they were utterly unable to appreciate; and, after they had adopted the up-and-down scale, they would be the first people to repudiate whichever movement did not suit their own book best. He would now ask the indulgence of the committee while he discussed the general principle connected with the question of dividend before he went to the consideration of the general principle of the revision clauses. Dividend was a thing that from time immemorial had always been an interesting subject of discussion in gas legislation. Before the year 1847, there was no limit by any general Act to the maximum amount of dividend, and there was a very free competitive trade being carried on; but when, in 1847, the first attempt was made by any general legislation to limit the amount of dividend, how it was arrived at was this, that the dividend should be either of a prescribed rate, as mentioned in the local and personal Act of the company itself, or 10 per cent. upon the paid-up capital. No one talked of guaranteed dividends in those days. All he gathered from it was this, that the principle was recognized that in this trade a return of 10 per cent. was a fair thing to allow the companies to pay, and that the price should be regulated so as to enable them to get at it; and if there had been nothing more in the Act than that one bare idea, one might have proceeded to say that the price and dividend were guaranteed, and that the price was fixed for the sole purpose of getting it; but they must travel beyond the dividend when they talked of the distribution of the profits of a company. While the 10 per cent. was recognized as a fair dividend, the amount of profit to be made by the company was not circumscribed only to a payment of their dividend, because while the dividend was limited, the Act encouraged the making of a larger amount of profit than was wanted for dividend; for it prescribed that the surplus beyond it should go to the reserve-fund, limited either to the prescribed amount mentioned in the personal Act, or to one-tenth of the nominal capital. Beyond that there was a further obligation recognized in doing justice to the company. By the 35th clause no reduction in price, the machinery for which was there alluded to, could take place until both the other two objects were accomplished, the whole 10 per cent. of dividend, and the whole completion of the reserve-fund. So that the amount of profit to be made by the company, which was the real thing to consider, and not the narrowness or the largeness of the dividend, was a profit anticipated to be equal to paying the 10 per cent. dividend, and equal to paying the reserve-fund, and nothing in the shape of reducing the price on account of the accumulation of profit could take place under that Act until both the preceding questions had been settled. Was the whole of this a mockery? Was it an illusion to talk about the reduction of price when the accumulation of profit became excessive? Was it an illusion to talk about having a reserve-fund? If it was not, then Parliament intended the companies to make an amount of profit equal to the three exigencies; and, inasmuch as the first exigency was dividend, it was idle to say that Parliament did not intend, as well as anticipate, that a 10 per cent. dividend should be obtained by the companies, and that those clauses were not mere illusions and myths that evaded one's grasp, but a public recognition of this, that an amount of profit should be fairly made that would do more than pay 10 per cent.; that should make a reserve-fund in addition; that should do more than make a reserve-fund, which should protect the public, when it got beyond it, by providing for a reduction of price, but always subject to the satisfaction of the two direct charges of reserve and of dividend.

The CHAIRMAN: You must bear in mind that the Gas-Works Clauses Act of 1847 did not prevent competition—it gave no monopoly—so that it would be more correct to say that what it did was to tell the companies that they might get up to 10 per cent., if they could find consumers who would take their gas.

Serjeant SARGOOD: I am willing to accept those words in their fullest integrity. I believe that is nothing more than what Parliament does now, notwithstanding all the changes; and I think I shall show that the spirit in which Parliament has dealt with the companies, although the phraseology and conditions may be changed, the spirit of the Act throughout, is to recognize that if the company can make 10 per cent. they shall divide it. It encourages them to make more, by anticipating that they may get a reserve-fund if the profits are larger than are wanted for the 10 per cent.

The CHAIRMAN: The Act of 1860 so far admitted the principle of the 10 per cent. not being obtained, that it says that under no condition should the price be raised above 5s. 6d., 10 per cent. or no 10 per cent.

Serjeant SARGOOD said that was true, but nobody ever doubted the 5s. 6d. price to be the highest maximum that was capable of producing the 10 per cent. dividend; because, while by clause 40 the company might raise their

price, if warranted by the increase in the cost of gas, there was no suggestion that they were to pay the penalty of a decreased dividend; on the contrary, all the provisions of the Act of 1847 were kept alive by which they were to divide that 10 per cent. if they could make it, except that they could not pay back dividends beyond six years. Then, in 1868, a little more restriction was put upon the companies, because, instead of getting 10 per cent. upon the paid-up capital, it must be a capital paid up and expended, and all the back dividends were cut off. No reserve-fund was allowed to them, but they were allowed an insurance-fund of 1 per cent. per annum, or 5 per cent. upon the paid-up capital, and the further surplus, if any, was to be carried to the divisible profit of next year. Was all that legislation about the 10 per cent. dividend a farce, or was it deliberately intended? They recognized in the companies then the power to earn, and threw upon them the duty to earn a larger amount of profit than was necessary to pay a dividend, because they encouraged the carrying of the surplus to an insurance-fund to meet any great emergencies of a special character, but for the existence of which there would be no means of paying them, except at the expense of the shareholders. He said again that that 10 per cent. was deliberately recognized by Parliament as a thing fairly to be aimed at and accomplished if the companies had any means of doing it by a system of fair trading. He did not call that a guarantee. They had been led into a good deal of discussion by the very innocent use of that word, but it was a rather incorrect application of it. In the nature of things it was impossible that it could be a guarantee. Dividend was simply a mode of applying profit. The first charge upon the profit was the dividend; the profit had to be earned, and as the amount to be earned could not be guaranteed, anything to be paid out of it necessarily could not be guaranteed. It was an obvious proposition that if the amount of profit itself could not be the subject of guarantee, anything that was dependent upon the profit was impossible to be a thing that was guaranteed. But, although not guaranteed, it was quite evident, from the language adopted by Mr. Cardwell's committee in 1867 (to which he now referred), that it was intended that the companies should divide 10 per cent. if they could earn it. Nothing was further from Mr. Cardwell's idea than that of guaranteeing such a state of profit as should necessarily of itself produce 10 per cent., and therefore he carefully abjured the notion that a statutory guaranteed dividend was a thing that existed, and in the nature of things he was quite right in doing it, for in terms a statutory dividend could not be guaranteed. But dropping the word "guarantee," and using the whole spirit of legislation as proceeding in good faith, as he knew it did proceed, what Mr. Cardwell meant was this: "It is my intention, in fixing the price, to have it calculated, not fixed on any arbitrary principle, but to have it calculated, so as to produce a sufficient amount of profit out of which to pay a 10 per cent. dividend." But with the utmost nicety of calculation it might not yield it; and therefore alone it was that Mr. Cardwell said, "You are not to look upon this as a guaranteed dividend." Parliament might have said to the gas companies, "Do you certain work on fixed principle, in a manner and according to a scale which we will settle, and we will guarantee you a dividend—*i.e.*, when you have done your best, and have only earned enough to give yourself 7 per cent., we will supplement it by 3 per cent., and fill up your cup to the brim." Of course that would be a substantial guarantee, and everybody would understand it; but while the companies had only the means of earning, providing they had the good luck to earn, it was idle to talk of things being guaranteed. He had thus considered the progressive mode in which Parliament had dealt with the question of dividend, in order that the committee might the more readily consider the principles of the revision clauses to which he clung, and which they were asked to destroy. The principle of them was exceedingly simple. The price, which was the lever on which everything turned, was allowed to be changed by a competent tribunal at the instance of either party. The interests of each party being adverse, the application would at once indicate, looking to the quarter from whence it came, what the object of the revision was. The companies were not likely to come to have a revision of the price downwards, because they were voluntarily holders of the price; the consumers were not very likely to come for a revision upwards, it being adverse to their own interests. But, in the conduct of the revision inquiry, the principle was clear that, though the price might be changed upon the application of either side, the opposite side being thereby put on its defence, the direction to the commissioners was distinct—they were not to fix an arbitrary price, they were to fix a price that was to be "calculated," involving in that one word every consideration, with reference to the manufacture of gas, that could be imported into that inquiry; and calculated to do what? Not calculated to pay a dividend, but calculated to yield, which meant calculated to create such an aggregate amount of profit as might be applied to the purposes for which profit was intended; and the very clause stated to what object the profit was to be applied. As a first charge, the price was calculated to yield a dividend; as a second charge, and only a second, after satisfying the first, it was calculated to yield an insurance-fund. Now that was quite consistent with the general scope and spirit of the Act. Apart from the revision clauses themselves, 3s. 9d. was the price that Mr. Cardwell and his committee, by the Act of 1868, fixed, having, as he thought, calculated that to be a price adequate to yield what? 10 per cent. dividend and an insurance-fund. And, if he had not honestly meant those two things to be earned out of the 3s. 9d. price, giving the precedence to the one over the other, he would not have provided, by another clause, what was to become of the surplus profits left when those two things were done, and there was something yet unapplied.

The CHAIRMAN: I do not think you need go into an argument to show that Mr. Cardwell did not frame his clause upon the supposition that it was only to be one-sided.

Serjeant SARGOOD said it was not with that object he should have to dwell upon his learned friend's strictures of what he called muddling up the dividend and the insurance-fund together; and he wanted to show that that was no more done under the revision clauses than it was under the Act itself. The Act fixed a price calculated to yield those two things, of which one had precedence over the other, but which 3s. 9d. price, any more than any other price, could never be guaranteed to yield the thing wanted. The price upon revision also was to be calculated to yield two things, of which one had a primary claim. What was the complaint of the promoters of this bill, and what their evidence? Referring to his learned friend's speech, he found plenty of declamation, but he could find no facts, no specific grounds on which those revision clauses were said to have miscarried. He could not help feeling that the Board of Works and the Corporation were hard taskmasters, and they might have delivered a brief to his learned friend in this way: "Herewith is a bill; we cannot say much in argument or evidence in favour of it, but you must abuse the revision clauses, and try and get them out and clause 6 in." If those had been his learned friend's instructions, all he could say was that he, like others, could not very well make bricks without straw; but he had done what he could; he had abused the legislation of 1868, saying that experience showed it to be entirely unworkable; that the inquiry before the commissioners was futile, and that the whole scheme of revision was a failure. He (Serjeant Sargood) wanted to know what all this declamation was about. If he had only that speech to answer, and the report of the revision inquiry in his hand, there was not a single tangible point upon which he could not have referred to the Blue Book for the purpose of refuting. He never, from beginning to end, made one single charge that the company could do themselves the justice of laying hold of, or feel called upon to answer. Was this affectation? Was there any real point of injury felt or complained of in 1873 and 1874? What did his learned friend say at the time when the grievance was hot upon him, and when the sore must have been felt far more distinctly than it was now? [The learned counsel read several passages from the speeches of Mr. Cripps before the Revision Commissioners, both in 1873 and 1874, to show that at that time, at least, he professed to entertain a very different opinion of the working of the Act. He also quoted from the evidence of Mr. Livesey and Mr. Gunn as to the searching character of the investigation before the commissioners.] Were the promoters men smarting under a real grievance? He asserted that it was affectation from beginning to end to say that the inquiry was simply abortive, because it could not end both ways, but must to the discomfiture of one or the other. What were the main points which his learned friend founded the whole discussion, or disclaimed upon? First, that the capital was not the subject of inquiry before the Revision Commissioners; and, secondly, that the dividend and insurance-fund had been inextricably mixed up together, and they could not get any justice upon the subject. As to capital, it was rightly excluded from their inquiry. The committee had heard that the commissioners took an opinion upon that, and before they had done so they had made up their minds, because the thing had been argued out by counsel on both sides. The 68th clause provided that "they shall fix such an illuminating power and such a price as shall be calculated to yield to the company, with due care and management, a dividend in that year (after allowing for the excess or surplus, if any, carried in the then last preceding year to the credit of the divisible profit, and to the insurance-fund of the company), attaining as near as may be, but in no case exceeding," a certain rate. Now, what had capital to do with that? That was the earning of profit; it was the progress of manufacture and sale which produced profit; it was in the earning of profit that due care and management was to be specially challenged, and therefore it was in the manufacture and sale, and the distribution and expenses attending it, in which due care and management had to be inquired into. Capital could not have entered into the minds of those who framed this Act. When authorized by Parliament, would any one be mad enough to advance capital to a company if they were told by-and-by that an inquest would be sitting to inquire whether or not they had raised this capital with circumspection to the consumers; and that though persons took up shares in the new capital, at the end of the year, when they wanted their dividend, and when the auditor had audited the accounts and allocated to them their share, they ran the risk that somebody would sit in judgment upon the issue, and say, "There was no due care and management in the calling up and use of this capital, and we disallow the dividend and destroy the company;" for he had no hesitation in saying that any such Utopian principle applied to a company as this—whether gas, or water, or railway—that could allow any set of men, however astute and intelligent, to sit in judgment upon the acts of the directors for the purpose of circumscribing the dividend to be paid upon any portion of the capital, would be utter destruction to any commercial undertaking. It could never have been dreamt of in any of the revision clauses, that the issuing and use of capital should ever be submitted to such a tribunal. He maintained that capital could not be unfairly raised or uselessly and improperly expended. Far from that, he did not know why he should suspect it. He did not know that anybody had ever charged it upon the companies except by innuendo. The promoters said there was a temptation to do so; but it was easy to see the utter fallacy of it. Did a commercial man, by getting £10,000 thrown into his business, which was to entitle the subscriber of that money to a share of the profits, do himself justice or injustice? If he did not need the capital he does himself an injustice.

The CHAIRMAN: It would entirely depend upon whether, as a commercial man, I was secured my 10 per cent. and no more.

Serjeant SARGOOD: There you hit the point, as you have several times in the course of this inquiry, by the very pertinent questions you put to my learned friend while arguing it. If there is an extraneous fund out of which you find some one weak enough to guarantee that each of the partners has a per centage on all capital introduced, I admit that you have a great inducement to get in an extra partner with £10,000, because you have somebody outside who will guarantee a profit. But if he only says I will give you leave to use that capital, and earn the portion to be given to the partner, that is another thing.

The CHAIRMAN: I do not know that it would be a disadvantage to let you know what I think was in the minds of the promoters as regards the capital question. If appears to me to be this. They think, here is a business by which more than 10 per cent. can be earned, but Parliament steps in, and says not more than 10 per cent. shall be divided. But the shareholders and the directors, though not able to get more than 10 per cent. upon their capital, are not prevented from issuing more capital than is necessary, so that, in fact, they secure the profits above 10 per cent. by dividing them over a larger quantity of capital, although they are not able to earn more upon any £100. That is what you have to answer.

Serjeant SARGOOD: When you reduce it into a practical question, what must a commercial mind do in order to see if it is substance and not shadow? Does it not really resolve itself into the first proposition I made? The profit to be made out of the business is the thing to be divided into a dividend and insurance-fund. Throwing in an additional £10,000 will not help you to make a profit. If you cannot use it so as to earn a profit for itself, it is an incubus upon the estate, and I admit if there was nothing to be done with the surplus profit beyond paying the dividend, it might be a very nice way of absorbing the surplus for the benefit of the shareholders upon an idle and wasteful amount of capital.

The CHAIRMAN: You do not catch what I mean, which is that it is not useless to them, because its use to them would be preventing their having the necessity of reducing the price, but enabling them to allot to their shareholders more capital, for which they would be secured 10 per cent. That I take to be the charge.

Serjeant SARGOOD said what they meant was this. Things standing as they are, the companies made an amount of profit giving them 10 per cent. upon their capital, and leaving a surplus. What was to be done with it? The Act of Parliament told them; but if they wanted to defeat that Act of Parliament, they might raise some fresh capital, which would act as a sponge to absorb the surplus amount of profit. He admitted that it could be done; but would the committee legislate under the belief that there was any pretence for saying it would be done? Was there one act of this or any one of the other companies which entitled them even to suspect that it would be done? Supposing they did not create that sponge of unwarranted capital in order to absorb the surplus profit, what would become of it? It would go into an insurance-fund. What was the use of that? To provide against heavy contingencies which, if they were not prepared for, might in a single half year absorb all the dividend they were paying to the shareholders. Now, he asked whether there would be due care and management in their fiduciary position towards their shareholders if they were to destroy that which would otherwise become an insurance-fund, by creating this sponge for the purpose of unfairly and improperly absorbing the surplus profits?

The CHAIRMAN: But supposing the insurance-fund complete.

Serjeant SARGOOD: I will tell you what I will suppose. I will suppose all these men to be dishonest; that is the shortest way.

The CHAIRMAN: I do not see that you have the right to make that inference. Once or twice it has been supposed that the allotting of capital to the shareholders is a dishonest act if not absolutely wanted. It is by no means clear to me that the directors would be under obligation to be as careful in the issue of their new capital as they would be if they had not these stipulations with regard to the dividend.

Serjeant SARGOOD said he thought he should be only representing the views of the directors of the Chartered Company, and he might say all the companies, if he told the committee that the directors, one and all, would feel that to issue capital which was not absolutely required for the exigencies of their trade, and merely for the purpose of absorbing a surplus amount of profit that would otherwise go into insurance, would be dishonour to them as gentlemen, discreditable to them as commercial men, and dishonest as regards their obligation towards Parliament. It was because they felt and believed that they were present to say, "Do not legislate against us as men whom you have ground to suspect, we being men against whom at present the finger of scorn has not been pointed, against whom no pretence of a charge has ever been made that we have raised one single shilling of capital otherwise than for the *bonâ fide* purpose of expending it in a productive manner to earn its own dividend." He was compelled to take the challenge in that point of view, and to ask the committee, sitting there judicially, before they attempted to legislate, to prevent a thing that it was possible to do with the slightest misconduct on their part as gentlemen and men of commerce—before they were persuaded or even thought of that suspicion, he asked them to stay their hand in that course of legislation, and not to put upon the big companies of London this slur, that they were not to be trusted in their discretion as directors to raise capital, except at times and under circumstances where it could be fairly raised.

The CHAIRMAN: I think I ought to call your attention to the fact that we have before us a very important letter from the Board of Trade, which is the Government department having to deal with this business, and you find in it a paragraph which I will read, because I think, after reading it, you will not be surprised at my having asked the questions I have:—"It is to be observed that, under the present system of fixed dividend it is as much to the interest of the companies to increase their capital as it is to the interest of the consumers that it should not be unnecessarily increased."

Serjeant SARGOOD: Sir, that is a truism; one might easily paraphrase that and say, "It is as much to the interest of a successful trader to increase his business by introducing increased capital, as it is to the cost of his customers that some of them who buy his goods must find his profits for paying him for introducing it." But the real question is, "Is this capital, when introduced, to earn its own reward in the shape of dividend? And, whenever you find that any company has been impeached for introducing new capital at a time when the exigencies of their trade do not demand it, surely it is then time to begin to talk about men acting without any possible inducement——

The CHAIRMAN: You have read the paragraph, no doubt, or that part of it beginning with "The tendency of such a system is, of course, to induce the companies to raise capital at a higher rate than is necessary, and also to induce them to raise more capital than is necessary."

Serjeant SARGOOD: Is that any other than a mercantile tendency?

Mr. BRISTOWE: On the point upon which you are at present I wish to make this remark, without making any imputation such as you speak of. Under one of the Acts the Chartered Company had power to raise by share capital £600,000, and they had power to borrow £200,000. The share capital is to be raised at 10 per cent. maximum, and the loan capital at 4½ per cent., and the fact is that you have raised all but £22,000 of share capital, and not one farthing of the loan. You have perfect authority to do it; but does not it show rather that it is not in the interest of the consumers exactly?

Serjeant SARGOOD: The moment you attempt the Utopian idea of making two opposite sides of the compass coalesce, you get into these difficulties. It is not in the interests of the consumers; I admit that.

Mr. BRISTOWE: The argument that you have been using is that the profit upon it will produce the dividend. Having raised this capital, you go to the commissioners appointed by the Board of Trade, and having raised the capital you use it (and I do not say that you are not entitled to do so) as a machinery for saying that you are compelled to give 10 per cent. upon the whole capital called up. I do not dispute that the capital is required; that is another point.

Serjeant SARGOOD said he would give a substantive answer to that directly. But he dealt now with the theory. He admitted that there were two ways of carrying capital into trade, one by borrowing of outside strangers at 4½ per cent., and the other by raising capital among the shareholders with the chance of getting 10 per cent. The tendency in the mind of the manufacturer would be rather to put his own money in and get 10 per cent., than to borrow from his neighbour and pay his neighbour 4½ and 5 per cent. And why should there not be that tendency? Until these companies were transferred into non-traders, as would be done if the works were sold to a corporation who did not work at a profit, what was the stimulus for trade? If a man were told to carry on this enormous business, pledge five millions or six millions of his money, and then if he wanted £10,000, though he was to do all the trade with it, and though he was to govern the business that that £10,000 was thrown into, that he must borrow it of his opposite neighbour, and give him 4½ per cent. for the use of it, what would the man say? He would say, "But, sir, while I am a trader with £10,000 in my pocket that I want to use, and get 10 per cent. for, why have you the right to put such an onus upon me as to tell me I shall borrow my capital in order to give somebody outside my trade the interest for his money while I keep my own idle in my pocket?" They must get into an embranglement by trying to make these men hold two positions. They could not be the trustees for the shareholders and the public. It was an utterly impossible position. The moment it was said that the public were to be protected by the shareholders, who provided the capital, not getting their statutory dividend, at that moment they arrived at the crisis when the only remedy for the evil was to let the public buy up the companies. It was an Utopian idea of trying to make men hold two positions; it got them into this embranglement of giving them a divided duty, which laid them open to the chance of neglecting the one to serve the other. He was bold to say, as a lawyer, as well as with some ideas of commerce in his mind, that the proper duty of the directors was towards their shareholders, and that to throw upon them, as would be by legislation, the duty towards the public, the first must be paramount and the last second. They had been talking of the pressure of 10 per cent. upon the public. It was a great mistake. The directors, as commercial men, were careful not to call up capital that would not earn its own reward, and that was why the Chartered Company, in calling up that portion of their present million that they required, had, of their own voluntary act, limited the interest to 5 per cent. for five years, when they might have kept it open for the chance of absorbing 10 per cent. And it was their obvious duty to do this towards their shareholders, because, if they called up this new capital at 10 per cent. while their enormous works were, to a large extent, unproductive, and upon the year's trading had only a profit which, divided over the whole capital, was equal to 9 per cent., what would the old shareholders say? They would say, "You are depriving me of 1 per cent., which my money is earning, in order to give it to others." The result would be that the new shareholders would get the full 9 per cent. upon the new capital, which was not earning five, and the old shareholders, whose old capital was long pledged to the trade, and earning more than 10 per cent., would have to put up with 9 per cent.

The CHAIRMAN: Looking simply to the interest of the shareholders, I do not see that they need have feared putting the 10 per cent. dividend at once upon the new capital, because they would be able to ask the commissioners to give it, if necessary, and the commissioners would not have power to inquire whether it was necessary to call up the capital or not.

Serjeant SARGOOD said, on behalf of the shareholders, he was persuaded they would never have availed themselves of the revision clauses for such a purpose. They never would have dreamt of putting the revision clauses in operation unless the exigencies of trade in the fair course of manufacture drove them to it, and the reason was this: In 1869 the public were paid, upon the share and loan capital combined, a rate of interest of only 4·8 per cent.; in 1870 they paid 5·4 per cent. upon the aggregate capital, loan and share capital mixed together; in 1871, on the loan and share capital, the dividend was 4·9; in 1872 it was 5·3; in 1873, with the revision coming in, and something the year before from one of the other companies, it was equal to 8·2; in 1874 it was equal to 4·5; and the whole aggregate of the share capital from the beginning down to 1874, taking the share capital and the loan capital mixed together, was a charge on the public of only 6 per cent.

The CHAIRMAN: It is no use my anticipating you, but that statement puzzles us. There is an enormous excess of share capital over loan, and we take it for granted that you get 10 per cent. upon all your share capital.

Serjeant SARGOOD: We do not.

Mr. BRISTOWE: You raised part of it at 5 per cent., with the option of converting it into ordinary stock at 10 per cent.

Serjeant SARGOOD said at the end of five years they proposed to give the new shareholders the option of asking for 10 per cent., and why had they fixed upon the five years? There was no arbitrary idea in it; it was simply because they expected, at the end of five years, the use of that capital would be fully developed, and its own fructification would afford the means of paying dividend. Did that appear like raising capital for the purpose of sponging up a fund? What he wanted to impress upon the committee was this, that those who threw out these innuendoes, that because things were possible they were therefore probable, were not to be listened to, when the line of conduct of the directors themselves showed that the thing was improbable because it never had been done. With reference, therefore, to capital, the idea of any review after the thing was done, as a commercial proposition, was disastrous in the extreme. The utmost that could be done would be this. Parliament, when it allowed an amount of new capital, say to the extent of a million, and anticipated that thereby it had supplied the prospective means of the company for 10 years, might put a further control on them, and say, "You shall call this capital up in certain proportions; we will be the judges as to when it will be necessary for you to do it, and will fix the dates at which you shall do it." If the capital was to be controlled, let Parliament take the control, or delegate it to the Board of Trade, or some competent authority; but let no idea be entertained of ordinary commissioners sitting in judgment on the mode in which capital has been raised, the only use of which was to entitle them to say, "We disallow so much of the capital, and will not allow you to pay a dividend upon it."

The CHAIRMAN: Before you leave the revision question, it is only fair to tell you what has been brought before us. We should not be doing our duty if we did not pay considerable attention to the paragraph in the Board of Trade letter, in which they state upon their responsibily, as being the department which is bound to look after this matter, that it is at least doubtful whether the revision clauses can be made to answer. You must bear this statement in consideration in the evidence which you give us.

Serjeant SARGOOD said he had much to say on the question of the working of the revision clauses; and much to show it was a terror without ground in supposing that they could not work, or that they were unworkable. He had been talking about the question of not discussing capital under the revision; now he came to the things that were discussed, the gravamen of his learned friend's complaint of the insurance-fund and dividend being mixed up together. Now, the committee would see that in the nature of things the suggestion was impossible; and the whole argument, declamatory as it was, proceeded upon a fallacy. The first point was that the dividend and insurance-fund, so far from being mixed up together, were only called into existence by the act of separation; and once separated and called into existence, could never thereafter be mixed up at all. The price to be fixed by the commissioners was to be calculated so as to yield a profit. It might or might not yield it; that depended upon circumstances. It depended upon the price at which goods were to be bought, and the price to be paid for the labour expended upon them. It depended upon whether there were any other and larger charges upon the profit that must be paid, although the commissioners never professed to allow a price that would cover them. If it did yield all that was anticipated, then the appropriation of any surplus beyond the dividend was imperative, and it was impossible that anybody could evade it. If it did not yield enough to pay the dividend, the dividend, being the first charge, would absorb all the profit, and there was no help for it, and that was the whole spirit of the Act. And it must be remembered that the price was given to them; the commissioners do not give them the profit. They did not give them a sum of money by way of profit to be divided. And if the price did not turn out enough to pay the dividend, the Act of Parliament never intended that it should go anywhere else except for dividend. Why was the increased price of the commissioners to be treated on a different principle to the 3s. 9d. price provided by the Act of Parliament? The first charge was the dividend: "If you can earn it, pay it: if you earn more, devote it to another purpose; if you earn less, you must put up with the loss." But the idea that the commissioners ever gave a sum of money to be allocated to particular purposes was untrue in fact, and unsound by way of argument. But instead of dealing with the price as a means to an end, his learned friend had dealt with it as *un fait accompli*, and called upon the company to account for having misapplied something which the commissioners gave them, whereas the commissioners never gave it at all.

The CHAIRMAN: I do not know that we need trouble you to proceed further about that. It is clear to us that the clauses of the Act permit the surpluses to be paid into the insurance-fund. They do not prevent the directors from lowering the price if they think fit, but they certainly do give them full permission to pay into the insurance-fund, up to 1-20th; and we are quite aware that the insurance-fund money once going into it cannot get out.

Serjeant SARGOOD: But what I want to meet is this. My learned friend has charged us with a *quasi* breach of trust, and I cannot allow such phraseology as this to go unchallenged?

The CHAIRMAN: We do not apprehend this to be a real charge.

Mr. CRIPPS: I used no such language as a "breach of trust," because under the Act of Parliament it could be done. My complaint was that the Act of Parliament and the clauses allowed it to be done.

Serjeant SARGOOD said the thing they were charged with doing could not be done. It was because his learned friend had confounded cause with effect that he had tried to produce an effect upon the mind of the committee to show that the Act of Parliament allowed it. The fallacy of the thing was that his learned friend was dealing with the thing as though they allocated a sum of money instead of giving the price with which the company could earn it.

The CHAIRMAN: We need not trouble you to say a word further upon that point. The 26th clause most distinctly says that if they earn an excess over the dividend it must go to the insurance-fund, and it is made still clearer by the 27th clause. The 27th clause enables them to carry the excess on to the divisible profit of the following year, but not unless the sum is more than enough to make up the insurance-fund.

Mr. CRIPPS: It is a strong point with us, and one that I urged before the commissioners, and urge again now, that after the commissioners gave what they thought sufficient for 10 per cent., they added that which they thought sufficient to earn an insurance-fund. That sum which they thought sufficient to give 10 per cent. turned out not to be sufficient according to the working of the company, though they said they thought it ought to be sufficient: and then the company laid hold of the extra sum which had been given to them to get an insurance-fund.

Serjeant SARGOOD: The company never laid hold of it.

Mr. BRISTOWE: You say they were bound to set aside part of what the

commissioners gave them as an insurance-fund, and Serjeant Sargood says that it is not so.

Mr. CRIPPS: It was proved that in addition to what was necessary to earn a 10 per cent. dividend a certain sum was necessary for an insurance-fund.

Mr. BIRLEY: You would not argue that in case the price of coal had materially advanced, the company would be bound to limit their dividends, and appropriate these profits to the insurance-fund?

Mr. CRIPPS: I say they are morally bound, but not according to the Act of Parliament; because the Act of Parliament has not said what shall be done with the money when received.

Serjeant SARGOOD said the Act of Parliament distinctly stated what was to be done with it when received. Was there any principle in stating that the price given by the Revision Commissioners should be dealt with in any other way than the price given by Mr. Cardwell? Mr. Cardwell gave 3s. 9d. that the company might earn a 10 per cent. dividend, and make an insurance-fund, and carry over the surplus to the next year, if any. Supposing that they did not make enough to pay the 10 per cent. and the insurance-fund, would anybody say that they were to give a rateable portion to the insurance-fund? Certainly not. The increased price was only subject to the same rule. He did not forget that his learned friend endeavoured to seduce the commissioners, on the face of their report, to divide the sum into three proportions. So much for the cost of gas, so much for dividend, and so much for insurance, and the three were added together. Supposing the company failed with this machinery to earn a sufficient profit, were they to ask their creditors to abate rateably with the dividend? There was no meaning in the principle if they did not, because supposing the price at last only produced enough to pay the creditors for the price of the gas, and there was no dividend at all, then how were they to deal with the subject? Would the creditors divide with the insurance-fund and the dividend so much as they claimed out of the price, because there it was allocated to them? Were the commissioners to say to the creditors of the companies, we have only allowed so much as the price of this gas to cover the cost. If, therefore, the company spend more than that the creditors must abate and put up with their aliquot proportion of price? The thing was Utopian and ridiculous. The whole thing in principle was covered by Act of Parliament. The price was the machine for earning profit, and when it had earned enough it had to go in a particular manner, and there was no reason why all the principles of the Act were to be subverted to deal with the Revision Commissioners price in one way while they dealt with Mr. Cardwell's price in another.

TUESDAY, JUNE 22.

Serjeant SARGOOD resumed his speech this morning by a brief reference to the evidence of Mr. Heisch. On the question of pressure, he mentioned that no evidence had been given why the company should be put under the special provisions of this bill which had not existed before, and reminded the committee that pressure meant leakage, and leakage meant waste; it meant bad management and want of due care, and it meant loss to the consumer; therefore, needless pressure was simply waste, to the cost of the consumer. On the question of accounts and auditing, he called the attention of the committee to this fact, that the form of accounts published by the company had been carefully settled by the auditor with the very view of giving all the detailed information which should be necessary for the very objects of a public inquiry. He then proceeded at great length to consider the question of what took place under the revisions of 1873 and 1874, with a view to show that the inquiry into due care and management was by no means crippled or limited, but was to the utmost extent, and in every branch gone into, and that the commissioners amply and fully discussed every point which they thought worth discussing. Having read and commented on the objections placed before the commissioners by the Metropolitan Board to the application of the company for a revision in 1873, he read the interrogatories demanded of the company by the corporation and the board, and remarked upon the exhaustive nature of the inquiry itself and upon the award of the commissioners. Any one would have thought that, if the inquiry of 1873 had proved abortive and useless, utterly vain, and a delusion, as it was alleged to have been, that those who so disclaimed against it would scarcely have taken the trouble in 1874 to go through the same farce, and yet in 1874 not only was this considered such an admirable tribunal, so well organized and so well adapted for the purpose of the inquiry, that the Board of Trade reconstituted it for that year; but the opponents of the company themselves followed in the wake that they themselves had led on the previous year, and the whole course of the revision started again in the very line of proceeding of 1873, as though experience had taught everybody the best way to deal with the case, and that there could not be any improvement by introducing any new doctrines. [After passing in review the proceedings of the second revision, the learned counsel proceeded.] They now ask you to wipe away all this revision, our only protection--the only ray of sunlight in the legislation of 1868 that is capable of shining upon us. They ask you to take it away and supplement it with a sliding scale of price. I confess, however specious that sounds to my mind, I have not yet been able to appreciate it logically.

The CHAIRMAN: Not quite the only ray; there was the 10 per cent. for all the fresh capital, as against the Imperial 7 per cent.

Serjeant SARGOOD: The 10 per cent. was given by the Act of 1847; that we have a right to.

The CHAIRMAN: No, I speak of your fresh capital.

Serjeant SARGOOD: I am much obliged to you for the challenge. That is part of the price paid for our acceptance of the obligation, and the price recognized by the subsequent Act of Parliament when the £1,000,000 was asked for.

The CHAIRMAN: Still, I think that was a ray of sunlight.

Serjeant SARGOOD: Be it so; I will admit that it is a ray, but I call that the purchase-money we were paid to undertake this obligation. Remember this, that when they gave us the 10 per cent. they only gave us that to which we hitherto had a right, and they deprived us of the reserve-fund by which we might have taken care of ourselves. Do you not think I am entitled to say that there was a *quid pro quo*? They said, "We will keep up the dividend on all your capital, but you shall no longer have the reserve-fund to supplement it, and next year you shall no longer have even the privilege of six years back dividends; they are completely swept away, and you shall remove your works out of town, and thus incur a great deal of expense."

The CHAIRMAN: I only want to remind you that there was a "*pro*" as well as a "*con*."

Serjeant SARGOOD: But the real price paid for this undertaking of ours in 1868 was, that the whole of our privileges were swept away except that fixed amount of dividend to be secured by a price. All that we had before is gone; the reserve-fund is stopped, there is no surplus money in existence by which we could supplement the dividend, and now we are asked to take the sliding scale. I have tried very hard to theorize this sliding scale, and I cannot see that it is a logical proposition. I understand a sliding scale in taxation, because I understand it to mean this: it is fitting the burden to the back. We sometimes hear of fitting the back to the burden, but the sliding scale in taxation means fitting the burden to the back. A sliding scale of this description, as a commercial idea, does not mean anything of the sort; and where it seems to me to be more specious than consistent is in this view of it, that if price is to be the engine by which profit is to be made, it is quite an illusion to say that the lower you make the price the more profit we will allow you to divide. If they will prove to me that the lower the price the more profit I can gain, then I can understand their promise, the more profit I will allow you to divide; but if price is the engine by which profit is made, then it is a delusion and a snare to tell me that the lower you make the price the more profit we will allow you to divide. I should like to see how I am to get my fair profit out of my lower price if price is the engine by which profit is manufactured. Take the converse: the higher the price the less profit you shall have; but if price is the engine by which profit is made, what is the meaning of telling me that the less price I charge the more profit I shall have?

Mr. BRASSEY: Supposing economy of administration was the engine by which profit is made, how then?

Serjeant SARGOOD: Economy of management. Due care and management must accompany the use of the engine, that I admit; but I assume that due care and management is exhibited.

Mr. BRASSEY: You assume that the maximum has been obtained already?

Serjeant SARGOOD: I take it as a commercial theory. It is not, as in taxation, a supplemental and outside quantity arising from another source which is to be manipulated and adapted as in the sliding scale of taxation, where the burden is regulated to the back. Here is one thing dependent upon another, but put in converse opposition; that is a thing which I cannot follow, even in theory, upon these clauses. You know, if you push the thing to an extreme, you get simply a *reductio ad absurdum*. Let me illustrate it in this way. If I lower my price, I may raise my profit on a graduated rising scale; but I may lower my price until I get to the point where I make no profit; but the theory of the clause is that I have then earned the right to distribute an enormous amount of profit. But the price makes the profit, and, as I lower it, how am I to get at the increased dividend which is held out to me as the reward for lowering the price? It is not a commercial proposition that will hold water, although as a fiscal proposition it is very sound. If profit is dependent upon price, *cæteris paribus*, larger price will give larger profit, and smaller price smaller, but to take the converse proposition is the *reductio ad absurdum;* I may increase my price to such an exorbitant extent that, notwithstanding all the profit it bears, I have reduced my right to distribute a dividend to *nil*. Is not this an illusion?

Mr. BIRLEY: But you are arguing this in the face of much commercial experience, which has shown that the reduction in price has practically brought an increase of profit with it. You are always having an increasing consumption.

Serjeant SARGOOD: It is a wonderful thing in gas experience that there is a certain normal state of increase in the trade, the variations in the increase of which are so small that you cannot look upon it as a commercial undertaking, to be pushed by the reduction of the price of the article. You cannot deal with the subject of gas in that way. The idea that seems to commend itself to my mind is this, that though as a fiscal proposition it may be very sound, as a commercial proposition the very fact that you test it by pushing it to the extreme shows that there is something in it hollow and rotten at the bottom.

The CHAIRMAN: It seems to me that you really cannot in this case import into the argument on either side the general principles of supply and demand, or of trade, because there is an attempt, and a successful attempt, by the Legislature, to decide what should be the price; and, therefore, the whole question lies here. As we have not in this trade the general check of the stimulus of supply and demand, we must attempt to replace it by some other motive, and the contention seems to lie between the existing machinery, which is a revision by gentlemen as competent as can be found, and the other which is presented in the bill—viz., a fine if you charge a high price, and a reward if you charge a low price; and I suppose the promoters consider that that would be a great stimulus to thoroughly good management, and a check against bad management.

Serjeant SARGOOD: I can very well understand that theory; but will you forgive me for saying that the injustice which is done to the companies in that mode of dealing with them is this, that the promoters start with a preconceived notion, or prejudice, that absence of due care and management is a thing to be necessarily inferred to exist in these companies, and that, therefore, any theory by which you can expel it from our operations will be acceptable, and ought to be introduced. But I say that until the absence of due care and management is distinctly proved, you have no right to assume that a body of intelligent and independent men, educated men, such as you see at the head of these affairs, are remiss in the discharge of their moral obligations to society.

The CHAIRMAN: It is only fair to you to say what has been passing through my mind as a man of business. It is true that we have left our decision entirely open. It would be quite unfair if we had not done that, especially as we have to hear your evidence, and the evidence of the commissioners; but I do not think there is any harm in stating that the idea before my mind is, that the general stimulus and interest in conducting a trade—that is to say, getting a larger or smaller profit—would be a greater stimulus to good management than the visits or inquiries of outsiders would be a check against bad management. What is wanted in the success of a trading concern is not the absence of bad management, but the presence of very good management.

Serjeant SARGOOD: You know what it involves. Are you not starting off on a mission which must be disappointing? Can you ever invent a self-acting parliamentary machine that shall make men discharge moral obligations?

The CHAIRMAN: I do not think you ought to address us so much upon the words, "moral obligations." It is hardly fair to the inquiry to import the word so strongly.

Serjeant SARGOOD: All I can say is, that my clients feel their moral susceptibilities are very much shocked by these continuous attacks upon them, and these continuous inquiries into their conduct, from which they come out periodically acquitted. And yet they are told, "You are men not to be trusted, but only to be suspected, and we must hedge you round about with a sort of parliamentary machinery that shall make it your interest to act fairly towards the consumers, for we cannot trust to your doing so disinterestedly." Are you not also carrying out the same thing that I mentioned yesterday—the Utopian attempt of making a man hold two positions? If you will insist upon these men being trustees for the public as well as for their shareholders, you put them in the invidious position of being open to suspicion, although, after constant attacks upon them, not one blot upon their conduct or management has ever been pointed out.

Mr. BRISTOWE: You cannot deny, of course, that these Acts of Parliament inevitably place the directors to some extent in that position?

Serjeant SARGOOD: They do, and all arising from this fact, that it is an interference (I do not say otherwise than legitimate) with the ordinary course of the exercise of mercantile discretion in carrying on the trade, and endeavouring to accomplish thereby the conservation of the interest of parties other than those whom they are legally bound to represent, and whose interests must be necessarily diametrically opposed to them.

Mr. BRISTOWE: You have a commercial monopoly, you know.

Serjeant SARGOOD: Yes, a parliamentary monopoly, regulated by parliamentary power.

Mr. TALBOT: If you have a monopoly you must not complain of the regulations.

Serjeant SARGOOD: Undoubtedly; and we want to obey them. We have adopted the legislation of 1868, and we are bound to conscientiously stand by it; we have acted up to it honestly and independently, at our own loss and cost; and we object to anybody coming in and again meddling with it, and subverting the very first principles upon which it is founded, without any adequate cause shown against us. Now let me see, in conclusion, how we stand ourselves in reference to this subject. Again I ask, who are our opponents? Do not be misled into supposing that because the popular cry in gas agitation is renewed this year, that the gas consumers are at the bottom of it, or that they have the slightest particle of interest in it, or care about it. We know what gas agitation is, and we know that there are some gentlemen at the head of it

whose sole popularity consists in being at the head, and who are themselves conscious that unless they keep moving they will be lost sight of. If there is a grievance on the part of the public, then I should like to know what it is, and to have it stated. Who are the people called before you? Mr. Newton and Mr. Shaw, the two heads (the one metropolitan and the other in the City) of the Gas Committees. These gentlemen seem to have found out, in their respective offices, the secret of perpetual motion. At any rate, they are always agitating. Are the consumers agitating? You have heard nothing of it, and I know nothing of it. Then we had Mr. Livesey, of the South Metropolitan Company. The truth is that the South Metropolitan Company is always pushed before us; but it is a sort of thing that no man can understand. The early history of that company is buried in oblivion. No one living can tell you how it got its position, and how it managed to appropriate such a large amount of business with so small an amount of apparent capital.

Mr. BRASSEY: Was it the result of an amalgamation?

Serjeant SARGOOD: I cannot tell.

The CHAIRMAN: Did it ever amalgamate? I interpret that to mean that it is a mysterious but most pleasant fact which you cannot account for.

Serjeant SARGOOD: It is a fact which I cannot account for. It is a pleasant fact for the present generation, but I have heard of other pleasant facts. I have heard of enormous undertakings being built by joint-stock companies which did not answer, and new companies being formed to take them up at half their price, which did answer, and that is a pleasant fact which one is able to account for.

The CHAIRMAN: But has the South Metropolitan Company not amalgamated?

Serjeant SARGOOD: There has been no amalgamation. Through how many phases of early life it has passed, no one living can tell, and as you very pertinently said, this does not account for it, and the other does not seem to account for it.

The CHAIRMAN: As you quote the questions I ask, it did appear to me to be accounted for by the fact that there was such a very different charge for capital. How it came to be I cannot tell. But I am willing to suppose, unless proved to the contrary, that it was good management from the beginning.

Serjeant SARGOOD: That is what I ask you not so readily to assume.

Mr. TALBOT: This is not a pre-historic subject; we can get at the bottom of it.

Serjeant SARGOOD: I do not think you can. Suppose in the early stage of its existence an enormous amount of income was absorbed in capital expenditure, that would account for the absence of new capital not having been called up, and the want of new capital not having been felt. Nothing having been proved, no one can come to any rational conclusion as to how that company stands in that position. Mr. Livesey, at any rate, puts himself forward as a very excellent manager. I am not here to say that he is not. In fact, I believe he bids very highly indeed for that general management of the whole of the metropolitan companies, whensoever they shall become absorbed into one, in the hands of the Metropolitan Board of Works (if ever that day is coming), and we shall see then whether with a large concern he will do as well as he does with a small one. Then we had Mr. Gunn, whose only offence during the whole course of the inquiry was this, that I happened to ask him whether he was a consumer, and he was rather inclined to make a solemn complaint to the committee that I had insulted him. I wanted to make out whether *quâ* consumer, as well as *quâ* accountant to the Metropolitan Board, he had anything to complain of. So that the only consumer that I attempted to ask whether he had a grievance resented it so much that I would not ask anybody else. Then you had Mr. Heisch, Mr. Keates, and Mr. Young; about whom I will say no more. You had one of the referees—the only one who ceased to continue to be a referee, for reasons which he was invited to explain to you—and you had Mr. Stevenson, of whom I desire to say no more. Now, sir, you are asked, at the instigation of the Board of Trade also, to make this violent change. One word as to that letter of the Board of Trade. It is the constant practice, and a very proper one, for the Board of Trade to make reports upon bills, in order to call the attention of the committees to whatever points appear to them ought to be considered when the bills come to consideration in committee. I never knew that it was the business of the Board of Trade to become *quasi* promoters; and, therefore, I was rather surprised to find in their letter, though I do not object to it, that there was a suggestion for knocking out one clause and supplementing it with another; and I was still more surprised to find that the people introducing a bill repudiating the principle of the Board of Trade clause, should be ready to adopt it rather than lose the bill. But let me say this much as regards the Board of Trade. The Board of Trade, as you will find, have been themselves the instigators, inviting the gas companies to submit to the legislation of Mr. Cardwell, and thereby, I suppose, showing that they thought it very good, very sound, and very practicable. I can tell you that there exists in print evidence that they have invited gas companies to take up that legislation and submit to it.

The CHAIRMAN: It is possible that a Government may change its policy?

Serjeant SARGOOD: There are two ideas involved in that—first, whether they have changed the policy. Now, let me ask you this: is a policy worth anything which is not well considered? What would be said to your policy, if you introduced one, having listened to the Metropolitan Board of Works and the Corporation, and not having invited us to express an opinion or to assist you? The suggestions of the Board of Trade are made upon an *ex parte* provocation, and if they had been invited to be your assessors in this committee, it is not for me to say what their views might have been after hearing all this evidence. I know that their views have been expressed without hearing evidence. Am I entitled to refer to the Board of Trade as a department of the Government?—I hardly should have ventured to do it myself, if the expression had not escaped you.

The CHAIRMAN: I think so. The letter begins, "The Board of Trade, on the part of Her Majesty's Government." The letter could hardly be framed in a way more intended to express the opinion of the Government.

Serjeant SARGOOD: Then, with every respect for Her Majesty's Government, let me say that, until assisted and advised by the labours of this committee, they have only had an opportunity of forming an opinion upon an *ex parte* statement; and that portion of Her Majesty's Government called the Board of Trade have been the most active agents in promoting all the amalgamations and schemes, and settling the conditions upon which they were to be carried out.

Mr. BRASSEY: The Board of Trade have been watching this question for a long series of years.

Serjeant SARGOOD: The long series is only seven, and this gigantic experiment has not had time to mature, before you are asked to subvert the very principles upon which it is founded. I consider the effects of Mr. Cardwell's legislation are not yet fairly developed. One of the grand schemes was amalgamation for the purpose of economy. In 1868, powers to amalgamate were specially given to us as regards the two City companies, and we put them into force and were amalgamated. But in 1871 the principle was again recognized in our local and personal Act by clause 56, which gives us the power to amalgamate with all or any of the existing companies in the metropolis. We have by virtue of that amalgamated with three more, so that we have absorbed into ourselves five of the then existing companies. Now, will anybody tell me, with those enormous works at Beckton, the biggest in Europe, not yet completed, and certain of the results of amalgamation therefore not yet completed and developed, that the time has arrived at which you are to upset the whole of Mr. Cardwell's legislation? The whole scope of the Beckton arrangement has been upon the basis of carrying out Mr. Cardwell's idea. Why should we have made works of that magnitude, except with the notion that the call upon us would be a call multiplied from time to time by the accession or absorption on our part of other companies. In 1868, also by our own Act, we had power given us to supply in bulk to other companies. Why were those powers given to us, and why have we adopted them, except with the intention of carrying out that legislation to the fullest extent? I do earnestly impress upon the minds of this committee that in this year, after only having five years experience of the amalgamation of the City companies, and two or three years experience of the amalgamation of the more recent companies, that you have not even had a fair chance of judging of what the ultimate effect of Mr. Cardwell's legislation upon the public interest will be; but you are to be terrified and frightened into an utter and sudden subversion of that which he, after such care, propounded, and upon no due cause shown. I boldly stand here, and say that notwithstanding all that has been said, all the declamation that has been indulged in, and at times the vituperation against these companies, there has been nothing brought home to us. Nay, more, there is no substantial charge made against us, and they have never even given us an opportunity of coming forward and defending ourselves against even an imaginary complaint. I say it is a breach of faith, it is unfair, it is not honest on the part of these men who themselves invented this Act of Parliament, and seduced us into accepting it under the promise and the protection of this 68th clause, to come down here before you, before our labours are even developed, much less finished, and to try and induce you, by a state of terrorism and a statement of theoretical testings, to upset the whole of the arrangements to which they were parties, and to which they are bound as honestly and conscientiously as though that Act of Parliament had been a contract under seal between us. They not only forced this legislation upon us in the House of Commons, in the year 1868, but they protected the bill from any alteration that could be made in it, by lodging, each of them, petitions in the House of Lords, when the bill went up there, against alterations. I denounce it in the strongest terms as against both these large bodies, the Corporation of London and the Metropolitan Board, as a gross breach of faith, utterly unprovoked by any conduct of ours, as could well be indulged in. They ask you now to step in, in the midst of our exertions, before we have had time to realize the advantage of the time present, much less before they have had time to find out what the results are. They ask you to immediately sever all the ties between us and the consumers, founded upon the legislation of 1868; and again to start upon a voyage of discovery in some new and hitherto untrodden direction, to find out whether another scheme introduced by consumers can be made sufficiently oppressive to those who serve them, or to find out some opportunity to raise the cry again, "Down with the sliding scale, down with the sliding scale," for that is what it will be. Do you believe that the companies can ever, in the discharge of their duty, consistently with due care and management, earn for themselves credit in character, and a larger dividend as the result, without instantly being hounded down by the consumers, as for 20 years past they have been? They are asking for such a new species of legislation as shall prevent the companies from obtaining the slightest advantage from that in which they are engaged. Now, in conclusion, let me say this: You are here in the interests of the public, and in the interests of the consumers. Have you any idea at all, any of you (I doubt if you have, for I am sure I had not until I asked them to give me the figure) what interest the consumers have in this inquiry? There are two things which you have had impressed upon you by my learned friend, the necessity for due care and management to prevent waste of property, and the expense of the ordeal of revision, which is looked upon as a grievance. Let me say one word on those subjects. Do you know what a penny per 1000 feet on gas means? My company is the biggest in Europe at this time. I cannot give the whole result over the metropolis; but I can tell you what it means in my company. One penny per 1000 in my company means £17,000. Therefore, remember this in the course of your inquiry, that we must, by the absence of due care and management, waste £17,000 before we can affect the consumers to the extent of one penny. Remember that, because it is against waste by want of care that we are talking, we must waste £17,000 before they are affected to the extent of one penny. As £17,000, or thereabouts, means one penny, so I may say that £4000 odd, or thereabouts, represents a farthing. Now, I may tell you that the revisions have never exceeded in their aggregate cost, the company, the consumers, and the commissioners, £4500, and not quite that. That means a farthing per 1000 feet. And let me tell you what is the operation upon the consumers in that point of view. The consumers in our company number 62,000, and I have asked my clients to separate them into large and small consumers, taking them at the 5s. price, 200,000 feet representing £50. The number of consumers who burn 200,000 feet and upwards are 3322; the number who burn less than that per annum are 58,678. Now when there is the great hue and cry in the interests of the consumers, it is right you should appreciate in money's number what it is all about. With regard to the big consumers, the average amount that they consume is 527,000 odd cubic feet, some more, some less. The average price a big man pays is £134 17s. 8d. Some may range, as I have told you, from £50, and others will reach very much higher; but that is the average. A little man burns on the average 37,000 feet per annum, and the price he pays on the average is £9 9s. 6d. Now let me apply the previous figures to this question: £17,000 worth of waste means a needless penny, and a needless penny to a big man who burns his 527,000 is about 44s. Do you think a man who pays £150 a year troubles his head for a moment about an odd 44s.? but to a little man the needless waste of a penny means 3s. 4½d., a man who pays on the average something under £10. Now, remember, you must imagine that we have wasted £17,000 before this effect is produced, and there is no ground for charging us with wasting £1000. And, then, with regard to the cost of the revision, which is a grievance, let me tell you what that is. To a big man, paying his £150 a year, the cost of revision means 11s., and to the little man it means 9½d. Do you think this "storm in a tea cup" is worth all this labour, if those are the highest results you can obtain from it? If we have wasted £17,000, and there is no proof that we have wasted £1000, and the utmost you can do is to relieve a man paying £150 of 40s. of the cost, and to relieve another man of 3s. 6d. of the cost of the revision, where is the great grievance? I have this result, that they at any rate saved 2d. in 1000 feet in one of their investigations, so that that would practically mean, to a big man who had to pay 11s. for the revision, a gain of 88s. by it, while the little man, who paid his 9½d., gained 6s. 9d. by the efforts of these combined corporations. That is the result of the revision. Now, I ask, what ground is there for changing this legislation? Either this is a hue and cry by public agitators for the sake of work to do, or it is an effort on the part of consumers for protection against needless loss. I am more inclined to think that it is an offspring of the first than of the latter cause, for I do not believe that, to save this possible amount, even if there were wasteful expenditure of £17,000 proved, that the consumers would have combined (for £17,000 is a fleabite in these inquiries), and I am perfectly sure of this, that the consumers cannot have combined to complain of the cost of a revision, when I find that the utmost you can say, on the average of small consumers, is, that they spend 9½d. in the successful effort to save 6s. 9d. Sir, on behalf of the Chartered Company I have only to thank you for the patience with which this committee have listened to this inquiry. I do not feel that we are impeached by any indictment here, or that we are called upon with any sufficient clearness to give evidence in answer to any allegation made against us, beyond very few points which, with due respect to you, we think ought to be cleared up by the witnesses whom we shall call. I am very willing, on behalf of the Chartered Company, to leave this matter to be considered or reported on by the committee, and I will only venture to ask that your minds may travel in this direction. If the 1860 legislation is, in your minds, as in Mr. Cardwell's, insufficient, has it not been sufficiently supplemented and

settled, both in principle and in practice, by the legislation of 1868? If you are of opinion that it has, whether you force upon other companies or invite them to adopt that legislation is immaterial to me, because I am not representing them, and have removed myself from them; but as regards the Chartered Company, who have taken up that Act in its integrity—and in all earnestness of purpose and conscientiousness of motive, in the hands of the directors, the Chartered Company have endeavoured conscientiously to carry it out—I do ask you, in the name of common sense, and in the interests of commercial effort, that you shall not disorganize the whole legislation of 1868 until more ample time has been given to develop its intention and its results, and until by that development you are driven to own that the thing has become abortive and unsuccessful, which, I venture to say, at this moment in no one point has been in the slightest degree proved.

Mr. *George C. Trewby*, examined by Mr. WEST.

I am manager of the Beckton works of The Gaslight and Coke Company, and have been for a long time engaged in the manufacture of gas. In my judgment it is not possible to raise the illuminating power of the gas at the testing station at Beckton three candles in less than half an hour, as given in evidence by Mr. Heisch. I have never received from Mr. Heisch any complaints as to the illuminating power of the gas supplied from Beckton; and I cannot conceive any means to be adopted to secure such a result as he supposes has been procured. From returns made to me in my official capacity, I find that the illuminating power on Nov. 23, 1874, at 5 a.m., was 16·98 candles, and at 11.45, which was the next test, 16·33. On December 12, Mr. Young stated that at 3.30 p.m. it was 14·43, and at 4 o'clock 14·88, or corrected 15. The nearest test I have for the same day is at 1 p.m., 16·46, and 4 p.m. 16·01, the average of the two being 16·23 corrected. On the same date Mr. Young gives two more, 5 o'clock 14·91, and 6 o'clock 17·32, but we have no corresponding tests for these hours. On December 19, at 4.30, Mr. Young gives 14·93; at 5, 16·77; at 6, 18·18; and at 7, 17·67. Our returns for the same day are, at 2.30, 16·61; at 6, 17·47; at 7, 16·64; and at 8.30, 16·93. Mr. Young's testings are taken 1000 yards from the works, and ours are taken on the works. On Feb. 25, 1875, Mr. Young gives, 11 a.m., 12·87 and 13·1; we had a test at 9.15 of 15·9, and the next, at 12, of 16·14. On March 2 Mr. Young gives at 10.40 p.m., 17·1, and 11.40, 16·16; while our returns show, at 10 p.m., 17·96; at 11, 16·78; and at 1 a.m., 16·88. On April 8 Mr. Young gives, 3.30 p.m., 15·68; 4.25, 15·94; 8.30, 16·92; 9.30, 17·1; 10.30, 18·04. Ours were, 2.30 p.m., 17·03; 4.30, 16·11; 8, 17·55; 9, 17·66; and 10 p.m., 17·61. Our instructions are to keep up to the parliamentary standard of 16 candles throughout the whole day, and it is our practice to do so as nearly as possible. During the quarter ending Sept. 30, 1874, we made 351 testings, and the average illuminating power was 16·40; in the quarter ending Dec 31 we made 425 testings, and the average illuminating power was 16·31. In the quarter ending March 31, 1875, we made 651 testings, and the average illuminating power was 16·25. That gives the number of testings as 1426, and the average illuminating power as 16·32. We have never supplied gas to the public direct without going through the holder. I have no possible interest in sending it out below the full illuminating power, and should incur a heavy censure from the directors were I to do so, and also involve them in penalties. In examining the official tests, and my own, I frequently find discrepancies. On Feb. 4, 1874, our test showed an illuminating power of 17½ candles, while that returned to us from the testing-station was only 15·9, but there were certain disturbing causes, which, to my mind, accounted for the difference. In testing the gas we adopt the conditions laid down by the referees; but we have two systems in operation at Beckton. There is first the jet photometer, by means of which the gas is continually burning through the jet, and as long as the illuminating power remains the same the height of the jet remains the same—that is a continuous testing. The other mode actually occupies about ten minutes, and the illuminating power is tested against candles, the result being those I have given you. That is the more accurate method, the first only being kept up for the sake of comparison, and also to see that we do not get below the illuminating power. The referees instructions are that 15 minutes, at least, are to elapse after letting the gas on before testing it, the object being that all the atmospheric air shall be driven out of the apparatus, and also to ensure that the gas shall come direct from the mains. If by chance the testing should be taken before the 15 minutes, it is likely the illuminating power would not be up to the full extent. We have recently had an illustration of how easily an error may arise in the returns made by the official testers; it was in a test for ammonia made by Mr. Young. We had been returned at about ·8 of a grain for days previously, when all at once our ammonia was returned at 4 grains, while we are only allowed 2½ grains by the referees. We were under a penalty, and our own test showed we were within the mark; and, quite by accident, I found that for that particular experiment the tester had used a new glass tube with new beads, the effect of which was to upset the experiment altogether. I am familiar with the whole of the workings and the whole of the buildings at Beckton, and consider them the best and finest in the world for the manufacture of gas. We have ships working to and from the North to our pier. We receive a telegram when they leave port, and in 36 hours, or sometimes less, we expect them at the pier. When the vessels pass Tilbury another telegram is sent to our men, so that there shall be no detention at the pier, and within twelve hours of the ships coming alongside they are discharging or on their way back. The cost of unloading the coal and depositing it in the retort-houses is 9d. a ton; that is without wear and tear. Within 48 hours after leaving the pits the coals are converted into gas. We can discharge as much as 4000 tons in 24 hours with our present appliances; and the pier could be extended to discharge five steamers instead of two. We have also facilities for receiving coal by railway in connexion with the Great Eastern, Midland, and other lines. We send our coke both by rail and river to all parts. As far as the coke sent by river is concerned, we shall be able eventually to command a higher price, as we have such facilities for loading; the vessels come in on one tide and are loaded and go away the next, and in some cases we can load them nearly on the same tide. During last winter our greatest make of gas was about 12½ million cubic feet in one day; next winter we shall be able to manufacture 19 millions. We have extensions on hand which will enable us, when completed, to make from 26½ to 27 millions. The proportion of capital per 1000 feet expended on Beckton was last year 11s. 4d. A considerable quantity of the works now in existence are not yet required; but as we extend our manufacturing power the rate of capital per 1000 feet will, of course, be proportionately decreased. We have also a large sum of money expended in cranes and locomotive engines, and in lime-kilns also, because we economize in every possible way and burn our own lime.

Cross-examined by Mr. PHILBRICK: Mr. Field's figures of 19s. 3d. as the amount of capital per 1000 feet of gas sold refer to the whole of our stations; I am speaking only of Beckton.

Mr. PHILBRICK: Then is it the policy of the Chartered Company to cease manufacturing as far as possible, excepting at Beckton?

Witness: The increase is to be provided for at Beckton for the next four or five years. I think we can manufacture gas as economically there as anywhere else.

Mr. PHILBRICK: What is the use of going there and having the finest works in the world unless you are able to beat your neighbours. When you get into full yield at Beckton, do not you think that you will be able to manufacture gas more economically than it is possible for any other company that has not your appliances, and staff, and works, to manufacture gas?

Witness: I will not venture an opinion upon that. A great deal depends upon the question of coke. In buying our coal as wholesale customers, we obtain it as cheaply as anybody, I should think. In unloading the coal to bring it to the works, our appliances enable us to do it economically, there being no canal dues on the river, and no demurrage, and the coal can be turned into gas within 48 or 56 hours, or within a very short time. In the manufacture itself, in the mode in which we deal with it, and the yield we obtain, we do quite as well as our neighbours.

Mr. PHILBRICK: As your works are the best, what prevents you from saying that you cannot do better than your neighbours; is it because you feel your situation is not so good?

Witness: No; it is simply that, as far as the cost of gas per 1000 feet is concerned, it resolves itself into what you can get for your coke. Except in regard to that item, we are at an advantage over our neighbours. As to the sale of our coke, that is a question of market. Going down to Beckton, where a great quantity of coke is produced, there is a large supply in a new district, and we have to make our market. To whatever extent the outlay on extension of plant may be made, it will, in my judgment, be decidedly profitable. It is an outlay in proportion to the increased quantity of gas we have to make.

Mr. PHILBRICK: As to the testings, you know that those made by the examiners are made at a place to which the company can have access, and where the company can have an officer present to watch the tests?

Witness: The official tests, yes.

Mr. PHILBRICK: Are these tests you have been giving to the committee taken in a place entirely in your own control, and to which no other human being has access except whom the company send there?

Witness: They are on our own works.

Mr. BRISTOWE: I think Mr. Heisch or Mr. Keates stated that they went to the works when they liked, and everything was opened to them.

Mr. PHILBRICK: That is the official place.

Mr. BRISTOWE: No, I think on the works.

Witness: We make no secret of it.

Cross-examination resumed: The men who take the tests at the works have been engaged for years for that purpose. The names are placed against every test made. Ten observations are made for one test, precisely as the referees prescribe. I will not go so far as to say that Mr. Young is an incompetent person to take the tests, but I do say that some blunder must have been committed, when there is such a discrepancy as between 17·5 and 15·9. I complained to Mr. Heisch some time ago that the tests did not agree with our own.

Mr. PHILBRICK: Did not Mr. Heisch tell you that the way in which your people took them was more careless and rough than the way in which they were taken by the examiners?

Witness: Upon the occasion I mentioned, there was a difference of about 8-10ths of a candle, and Mr. Heisch said it was not more than the general difference that took place between our testings. I find the average of testings agreed, but every now and then we had these small discrepancies. I do not believe in the allegation that the testing at the works or at 1000 yards from the works ought to produce different results. I have no doubt that Mr. Young's test really showed the quantity of ammonia he stated; the misfortune is that he should not at once have written across his experiment the word "doubtful;" he should have seen there was some disturbing cause.

Re-examined by Mr. WEST: I never heard before of the unofficial tests referred to by Mr. Young. At the present moment we supply gas 2 candles better than any other company in London, under our Act of Parliament. To protect ourselves from penalties we are obliged to keep a good average above our 16 candles, the same as others have to keep an average above 14 candles. We also supply cheaper than any company except the South Metropolitan Company. The proportion of gas manufactured at Beckton as compared with Notting Hill is about four times as much. The works at Brick Lane, Curtain Road, and Blackfriars have been shut up for some time, and it is the intention of the company to close the works at Horseferry Road.

By Mr. BRASSEY: I should think the extreme distance at which we supply gas from Beckton is 17 or 18 miles.

By the CHAIRMAN: The leakage is taken upon the whole district of the company. Practically, there is no leakage on our large main between Beckton and Notting Hill.

Mr. TALBOT: As to the raising of the illuminating power, have you considered whether the infusion of a certain amount of cannel gas could have that effect?

Witness: We have to do it from time to time, but we find the greatest difficulty in getting the illuminating power up.

Mr. TALBOT: Is it not true that, by infusing more than an ordinary amount of cannel gas, you would have the large rise of illuminating power spoken of in a short time?

Witness: Practically, it cannot be done; it might be done experimentally.

By Mr. BRISTOWE: When I say it is not practicable, that is with reference to the engineering arrangements of our works, our mains being charged entirely from the gasholders. The leakage would not affect the illuminating power.

By Mr. TALBOT: We pay the same wages as other companies, and we have not the slightest difficulty in getting men.

By Mr. BRASSEY: We employ, for the manufacture of gas, about 1000 men in the winter time at Beckton.

Dr. *John Whitmore*, examined by Mr. BROUGHTON.

I am medical officer of health for the parish of St. Marylebone, and have been gas examiner for eleven years. I was official examiner until the Act of 1868, and since then I have acted for the parish and the vestry. I test the two gases supplied by the Chartered Company and the gas supplied by the Imperial Company. The tests are made by a competent assistant, but are supervised by myself personally. The photometer I use is Letheby's bar photometer. The apparatus and mode of testing is in strict conformity with the regulations ordered by the gas referees in their memorandum for 1874 and 1875. The apparatus is kept in order by Mr. Sugg. Our testing hours for the Chartered gas are from half-past 5 in the evening till 8, those being the hours prescribed by the Act of 1868. The Imperial Company are not under that Act, and our testings of their gas are made from 10 in the morning till 3 or 4 in the afternoon. I have copied from my book the results of five years testings of the Chartered Company's gas, thinking that would be enough for the purposes of the committee, and I find that from 1870 to 1874 the mean illuminating power was 16·6 candles.

By Mr. PHILBRICK: The mean of the monthly testings for the entire five years always exceeded 16 candles, except upon one occasion, in October, 1870, when it was 15·9 candles. In seven months of the entire five years the monthly mean exceeded 17 candles, and in 28 other months the mean exceeded 16·5, reaching, on many of those occasions, to 16·9. The average testings are 25 in the month, testing every day, Sundays excepted. The actual lowest illuminating power on any single testing, throughout the five years, was 15 candles; and, taking the mean of all the lowest testings in every month during the five years, it was 15·9 candles, or one-tenth less than the mean. The mean highest in the same months was 17 candles, but in single testings it frequently reached 18 candles. To go to particular dates, on Nov. 28, 1874, at 3.30 p.m., the result of the testing was 16·2; on Dec. 12, at 10.30 a.m., it was 16·5; on Dec. 19, at 1.30 p.m., it was 16.1; on Feb. 25, 1875, at 3.30 p.m., it was 17.1; and on no single occasion in that month did the testing ever fail below 16. On the 8th of April, at 1.15 p.m., it was 15·2; that single testing was, of course, considerably below the average. I am told our testing station is 15 miles from the works. The gas goes from Beckton to the Horseferry Road, which is 12 miles, and then, by a very circuitous route, to the Court House of Marylebone,

where my testing station is; that is five miles more. The effect of such a journey upon the gas is a debateable point; I cannot help thinking it loses something in its illuminating power.

By Mr. BIRLEY: That is not clearly ascertained yet. I have taken some trouble to arrive at the information, and my opinion is, that though there would be at that distance some undoubted reduction, I do not think it would be to the extent which I have heard stated. When gas is travelling rapidly through mains, there may not be a great reduction; but at the time the gas lies in the mains and becomes more and more condensed, I think there is a considerable reduction in the illuminating power. Gas is supposed to become purer by travelling along the mains; in cold nights in the winter it deposits something very injurious, and which cannot always be provided against—that is naphthaline. Naphthaline is extremely offensive; it chokes up the mains, and very often we get a reduction in the quantity of light given by the lamps, for which I do not think the gas companies can be held responsible.

Examination resumed: No doubt the gas would lose more in illuminating power in going to Marylebone than it would in going to the City from Beckton. I have heard it stated that there has been a great variation in illuminating power in a very short time, but I should hardly think it possible it could be so, unless you could empty the gasholder and the retorts, and suddenly throw into the retorts a large quantity of cannel coal. It is possible to do so; but I do not think it possible to produce that great variation in illuminating power in so short a time. In the parish of Marylebone I do not think the Chartered Company supply more than one-sixth or one-eighth of the entire district. The only complaint I have heard has been that sometimes the pressure is not sufficient in the early hours of the evening. In the case of one establishment where £1600 a year is paid for gas, the senior partner of the firm told me that they did not get quite so much light as they wished, inasmuch as they often had to light their gas by half-past three in the afternoon, and in an hour or two afterwards the lights suddenly jumped up, to the destruction of the gas globes and glasses, and inconvenience of the establishment. That is caused by the pressure being suddenly increased after maintaining a low pressure during the hours when gas is not largely consumed. I think it would be much to the advantage of gas consumers if there was more uniformity between the night and day pressure; the pressure is from about 8-10ths of an inch to an inch in the day, and is apt sometimes to jump up to 2 and 2½ inches. The pressure required by the Act is 6-10ths, I think, and it is very rarely below that.

By Mr. BRISTOWE: Householders sometimes write to me and say they cannot get light enough, or their light is very bad, or impure, and I generally on those occasions, cause the letter to be sent to the gas inspector of the district, who invariably investigates the case, the almost invariable result being that the fault is not with the gas, but either with the fittings, or the burners, or with the insufficient size of the meter, or something else connected with the house in which it is burnt. An instance of that kind occurred in my own house recently. I take great care to use the best burner, and try to get the best light I can, but was unable to obtain the necessary amount required in my dining-room. The gas inspector examined it, and found my gas-fittings choked up with oxide of iron and dust, and corroded in a manner which materially lessened the calibre of the pipes. When it was blown out it amounted pretty much to a hat full, and my gas has burnt very well since. The same condition of things exists with many gas consumers; they do not pay sufficient attention to the gas-burners. That particularly applies to small consumers. It is necessary now and then to change the burners, but that depends upon what burners they are. In my experience it is an uncommon thing for consumers to pay due attention to the burners, and clean them and have them renewed, the effect being that due justice is not done to the gas when consumed in that manner. I have in my possession now an Argand burner in very good condition, which, with the 16-candle gas obtained from Sugg's standard, will not give 10-candles, and yet such Argand burners as those are made and sold; but that, of course, is the fault of the consumer, and not of the company.

Cross-examined by Mr. CRIPPS: The Chartered gas which I tested was a mixed gas, both from Beckton and Bow, the proportions being five-sixths of the former and one-sixth of the latter. I think there is great difficulty in keeping up a regular illuminating power. Neither the twenty-eight months nor the seven months are consecutive, but they are the highest and the lowest.

The CHAIRMAN: You say you have in your district two companies, the Imperial having the larger share of that district; do you find the consumers give you any opinion as to whether they like one gas better than the other?

Witness: No. I may say that the complaints, excepting upon foggy nights, when we know it is difficult to get a good light, do not refer to the quality of the light, but to the quantity. What I say about the absence of complaint applies as much to the Imperial as to the Chartered Company. I do not think a consumer who was not able scientifically to test the gas would find out any difference between the two.

(To be continued.)

Legal Intelligence.

COURT OF CHANCERY.—TUESDAY, JULY 6.

(Before the MASTER OF THE ROLLS.)

LOW *v.* THE LAMBETH WATER-WORKS COMPANY.

Mr. FRY, Q.C., and Mr. MAIDLOW were heard for the plaintiff; Mr. SOUTHGATE, Q.C., and Mr. YATE LEE appeared for the defendants.

This suit raised a question of some importance to householders—namely, whether the occupier of a house has a right to use water for watering his garden without paying an extra rate for such supply. The defendants are incorporated by an Act of Parliament, which provides that they shall furnish to owners or occupiers of houses in the district a sufficient supply of water for their domestic uses at rates varying with the annual value of the houses, and that a supply of water for domestic purposes shall not include a supply of water for baths, horses, or cattle, or for washing carriages, or for any other trade or business whatsoever. The plaintiff has been in the habit since 1864 of watering his garden by means of cans filled from a tap placed outside his house. In January, 1872, the defendants gave notice to their customers that their ordinary charges for water did not include water for fountains, greenhouses, ponds, or gardens, where hoses or stand-pipes were used, and they proposed to charge the plaintiff £4 4s. per annum for his extra garden service. The plaintiff refused to pay this sum, offering, however, to pay what he called "a fair rate;" and on the company's secretary writing that, unless the extra rate was paid, they would be under the necessity of withdrawing the supply of water, the bill was filed, praying, so long as the plaintiff paid his water-rates and did not offend against the provisions of the defendants Acts, the company might be restrained from stopping the flow of water into his house. The defendants case was that the supply of water for gardens was not a domestic purpose within the meaning of their Act. They did not, they said, object to people watering their gardens by means of cans dipped into house cisterns, or filled by means of taps placed within their houses, but they were compelled to make an extra charge where gardens were watered in any other manner, owing to the enormous quantity of water thus consumed and the great cost of pumping. They referred to the case of a gentleman, not named, who paid a water-rate of £15 a year only in respect of his house, and who was ascertained to have used in watering his gardens and conservatories, between the 4th of August and the 29th of November, 1873, 746,000 gallons of water, which, at the moderate price of 1s. per 1000 gallons, would be worth £125 per annum.

The MASTER of the ROLLS, in giving judgment, without calling on the defendants counsel, said the bill was to compel the Lambeth Water-Works Company to supply the plaintiff's house and garden with water, and, consequently, not a bill which the court was in the habit of entertaining, in the absence of proof of irreparable injury, the proper remedy being at law. The chief question was, whether the use of water for a garden was a domestic purpose. It had been argued that it was, because, legally speaking, the garden is part of the house; but his honour thought that the word was used in the Act in its popular, rather than its legal sense. Upon the whole, without wishing to dogmatize on the definition of a "domestic purpose," he should hold that the use of water for a garden was not a domestic purpose, and, as he had already decided that the suit was not maintainable, he should dismiss the bill, with costs.

COURT OF QUEEN'S BENCH.—MONDAY, JULY 5.

(Sittings in Banco, before Justices BLACKBURN, MELLOR, *and* LUSH.)

CATTLE *v.* THE STOCKTON AND MIDDLESBROUGH WATER-WORKS COMPANY.

This case, which was argued during term, arose out of an action tried before Baron Amphlett, at Leeds, when a verdict was returned for the plaintiff, damages £26, subject to leave reserved. The facts proved were as follows:—The defendants are a water-works company, incorporated under an Act of Parliament, and they had powers conferred upon them to lay down their pipes under a turnpike road, and the soil in and under the road was declared to be the property of the adjoining landowner. A gentleman named Knight was the owner of the soil on each side of the turnpike road, and desiring to drive a tunnel from one side of the road to the other to make a communication with his works, he engaged the plaintiff, a contractor, to make it. It was discovered that, from some cause or other, there had been left a considerable aperture in the water-works pipes, but while they remained undisturbed there was very little damage done. When the plaintiff began his operations he was put to the extra cost of £26 through the water oozing through. Mr. Knight got the consent of the Highway Board to take up the road in order to make this tunnel; and one point made by the defendants was that the plaintiff might have been indicted for taking up the highway, and consequently it was said that he could not recover for any damage through his own wrong. The main question was whether under such circumstances the plaintiff was entitled to recover at all against the company, they owing him no duty, or whether any action would lie at all for anybody in such a case. The question was reserved and argued, and the court had taken time to consider their judgment.

Justice BLACKBURN now delivered judgment, in which he and Justice Mellor and Justice Field (who heard the case) concurred, to the effect that the plaintiff was not entitled to sue the company. The court need not determine whether there was any defence, for they thought that a person could recover for a partial obstruction of the highway when a wrong was committed by another person. It was argued on the one side that the defendants were under an absolute obligation to keep the water in their pipes, and therefore it was not necessary to prove negligence. The defendants counsel contended that such a doctrine could not apply, because the defendants were authorized under statute. It was unnecessary to decide these questions, for they intended to make the rule absolute for the defendants on another ground. Assuming that Knight might have maintained an action for the damage, and that he might have under the circumstances recovered the amount as trustee for Cattle, the question was still, could Cattle sue in his own name for the loss which he had sustained in consequence of damage to Knight, causing Cattle to lose money under his contract? Their lordships thought not; for, if so, then the defendants would be liable to workmen in a mine for stoppage of their work, and without saying whether this might or might not be just, the law did not give them the right. In the present case, there was no pretence for saying that the defendants were malicious, although they were negligent. Under the circumstances, there was no right of action on the plaintiff, and consequently the rule to set aside the verdict must be made absolute.

Rule absolute accordingly.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

Dr. Letheby, the chief gas examiner appointed by the Board of Trade, has recently reported to the Corporation of London and the Metropolitan Board of Works on the quality of the gas supplied during the last three months from the several gas-works of the Chartered, the Imperial, and the South Metropolitan Gas Companies. The maximum, minimum, and average illuminating power of the gas at each of the testing-places have been as follows:—

Illuminating Power in Standard Sperm Candles.

	Description of Gas and Testing-Place.	Max.	Min.	Aver.
Char-tered Gas	Common gas, Beckton, North Woolwich	19·6	16·3	17·63
	,, Friendly Place, Mile End	17·9	16·0	16·76
	,, Ladbroke Grove	18·1	16·0	16·97
	Cannel gas, Millbank Street	22·5	20·0	21·13
Imperl. Gas.	Common gas, Carlyle Square, Chelsea.	17·5	15·0	16·02
	,, Camden St., Camden Town.	17·1	14·0	15·76
	,, Graham Road, Dalston	18·0	15·9	16·82
	,, Bruce Terrace, Bow	17·8	14·5	16·27
South Metropolitan Company, Hill St., Peckham		16·5	14·5	15·70

These results show that the illuminating power of the common gas, when burnt at the rate of 5 cubic feet an hour from a Sugg's "London" Argand, No. 1, with a 6-inch chimney, and of the cannel gas when burnt at the same rate per hour from a Sugg's steatite bat's-wing burner, has been at all times equal to the requirements of the Acts of Parliament, and the averages for the quarter have been greatly above the parliamentary standard. As regards purity, Dr. Letheby reports that the gas at all the testing-places has been constantly free from sulphuretted hydrogen, and that the amount of sulphur in other forms than this has been as follows:—

Grains of Sulphur per 100 *Cubic Feet of Gas.*

	Description of Gas and Testing-Place.	Max.	Min.	Aver.
Char-tered Gas	Common gas, Beckton, North Woolwich	14·2	5·4	10·35
	,, Friendly Place, Mile End	16·3	5·4	9·42
	,, Ladbroke Grove	16·6	6·5	10·40
	Cannel gas, Millbank Street	16·8	8·2	11·06
Imprl. Gas.	Common gas, Carlyle Square, Chelsea	30·6	14·1	18·23
	,, Camden St., Camden Town.	29·8	8·1	12·69
	,, Graham Road, Dalston	17·3	5·9	13·35
	,, Bruce Terrace, Bow	13·8	4·5	9·04
South Metropolitan Company, Hill St., Peckham		20·5	9·0	13·42

The gas at Friendly Place, Mile End, contained an excess of sulphur on one occasion, and the same was the case with the gas at Hill Street, Peckham. On fourteen occasions the gas at Carlyle Square was overcharged with sulphur, and on seven occasions that at Camden Street, Camden Town. Both of these have been the subjects of appeal, under the provisions of the 65th clause of the Imperial Gas Act, 1869, and Dr. Letheby reports that the excess in the gas at Carlyle Square was occasioned by an unavoidable cause, due to the alterations which are being made in the purifiers, with a view of meeting the requirements of the ensuing winter; but as regards excess in the gas at Camden Street, the chief gas examiner is unable to certify that it was the result of accidental or unavoidable cause.

The proportions of ammonia in the gas at all the testing-places, excepting Millbank Street, have been constantly below the prescribed quantity of 2·5 grains per 100 cubic feet. At Millbank Street there was an excess on four occasions.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in the parish of Marylebone during June:—

1875.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon. in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 24 Obsers.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Comp.'s gas	16·82	17·70	15·91	21·65	9·12	25·84	0·73	No trace
Chartered Comp.'s common gas	16·08	17·31	15·11	31·12	13·87	13·36	0·60	No trace
Chartered Comp.'s cannel gas	20·95	22·41	20·00	21·17	10·08	17·23	0·73	No trace

Mean of daily readings of barometer . . . . 29·72
" " " thermometer . . . 69·16

* Each observation consists of ten readings of the photometer, at intervals of one minute.

During the month the mean illuminating power of the Imperial gas was equal to 16·82 candles; it ranged between 15·91 and 17·70 candles, showing, at its lowest, just upon two candles above the standard required by law. The mean amount of sulphur in 100 cubic feet of this gas was 25·84 grains, and of ammonia 0·73 of a grain. The mean intensity of light of the Chartered common gas was equal to 16·08 candles; it ranged between 15·11 and 17·31 candles; twice it exceeded 17 candles. The mean quantity of sulphur was 13·36 grains, and of ammonia rather more than half a grain. The mean light of the cannel gas was equal to nearly 21 candles; it ranged between 20 and 22·41 candles; three times it exceeded 20 candles. The mean quantity of sulphur found was 17·23 grains, and of ammonia 0·73 of a grain. The pressure of all the gases was good, and on no occasion was sulphuretted hydrogen detected in either of them by the usual tests. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas manufactured at their works, Beckton and Bow.

Dr. Stevenson's report on the gas supplied by the Imperial Company to the vestry of St. Pancras, during the month of June, 1875:—Maximum light, estimated by sperm candles, according to the Act—15·3. Minimum light, sperm candles—13·4. Average light, sperm candles—14·2. Traces of ammonia, indicated by turmeric test-paper—traces only on all occasions. Traces of sulphuretted hydrogen, indicated by lead test-paper—none on any occasion. Sulphur, 12·12 grains per 100 cubic feet.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health on the composition and quality of the metropolitan waters in June, 1875:—

Names of Water Companies.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	18·23	0·051	0·131	0·001	14·0	3·3
West Middlesex	18·07	0·044	0·151	0·000	14·0	3·3
Southwark and Vauxhall	18·36	0·052	0·144	0·001	14·0	3·3
Chelsea	18·33	0·056	0·167	0·001	14·0	3·3
Lambeth	18·80	0·055	0·180	0·001	14·0	3·3
Other Companies.						
Kent	27·83	0·007	0·292	0·000	20·8	5·8
New River	17·83	0·014	0·143	0·000	14·0	3·3
East London	18·73	0·046	0·171	0·000	14·0	3·5

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was very slightly turbid—namely, in those of the Grand Junction, the Southwark and Vauxhall, and the Chelsea Companies. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Society of Medical Officers of Health, 121,543,736 gallons; and the number of houses supplied was 517,489. This is at the rate of 35·3 gallons per head of the population daily. The last official return from Paris stated that the average daily supply per head of the population was 31·4 gallons; but this includes the water used for the public fountains, and for the ornamental waters in the Bois de Vincennes and the Bois de Boulogne. HY. LETHEBY, M.B.

Dr. Whitmore's report on the composition of Thames companies and other waters supplied in Marylebone during June:—

1875.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by incineration of Solid Matter in previous column.		Hardness before boiling, in degrees.	Hardness after boiling, in degrees.
	June, 1874.	June, 1875.	June, 1874.	June, 1875.		
Distilled Water	0°	0°	0°	0°	0°	0°
West Middlesex water	18·06	17·36	0·72	0·80	12·14	2·64
Grand Junction water	18·24	17·92	0·80	0·88	12·43	2·71

* The loss by incineration represents the amount of organic and other volatile matters contained in the Imperial gallon (70,000 grains) of water.

During the month the water supplied by the Thames companies to the parish was generally clear, bright, and well filtered; on one occasion that supplied by the West Middlesex was slightly turbid—a circumstance very unusual with this water. As compared with the analysis of June, 1874, the above shows a reduction in the amount of solid matter, as well as in the hardness of both companies water.

"THE TIMES" ON THE LONDON WATER SUPPLY.—Some time ago a letter appeared in *The Times* from Dr. Sandwith, calling attention to the bad condition of the drinking water at one of the West-end clubs, and commenting severely upon the state of the London water supply generally. In consequence of this letter the President of the Local Government Board, to whom the supervision of the London water supply has been assigned by Parliament, sent Major Bolton, R.E., the water examiner of the board, to the club in question, with directions to inquire into the subject. Having had every facility afforded him for the purpose by the committee of the club, Major Bolton was enabled to point out certain defects in the arrangements of the water-pipes and cisterns, which, in his opinion, fully accounted for the presence in the club's drinking water of the impurities that had attracted so much attention. It is now understood that the whole of the suggestions made by Major Bolton for the future prevention of these sources of pollution have been adopted and carried out by the committee of the club, so that the members may now drink water without any fear of imbibing any of the very unpleasant extraneous matters indicated in Dr. Sandwith's letter, which, as it now appears, were added in the club's cisterns, and not supplied by the water company.

BRITISH ASSOCIATION OF GAS MANAGERS.

WEDNESDAY, JUNE 9.

(*Continued from page* 30.)

Mr. J. DOUGLAS (Portsea) read the following paper on

SYSTEMATIC TESTING OF CONSUMERS METERS.

It is essential, at the outset of this short paper, that I should clearly set before you the object I have in view. In the first place, I have no intention of plunging into the sea of controversy as to the relative merits of wet and dry meters; and, although it may appear, in the course of the paper, that my personal predilections are in a particular direction, I wish, as far as possible, not to lead the discussion away from the subject of "systematic testing," into personal experiences as to whether a wet or a dry meter is, on the whole, the better instrument. In the second place, I should greatly regret that the mention of makers names should lead any one to suppose that these particularized manufacturers produce a better article than others to whom I do not refer. I have been in considerable doubt how far I should be justified in naming manufacturers at all, but that doubt has only been overcome by remembering that, for a paper to have the greatest practical value, it must be founded on experience, and the object of our meeting here to-day is to present to our members the actual facts with which we are dealing—"Things that winna ding and daurna be disputed," as Burns says—and if we have the temerity to generalize or deduce from these facts, others are equally free to form their own conclusions, and make their own deductions.

At the outset, therefore, I ask you to guard against any idea that I am either recommending one firm by mentioning the name, or depreciating another by the omission. The truth is, my experience has been confined to the makers whom I specify, but the experience of each one here is quite as good as my own, and from your own experience you must judge. It affords me also the greatest satisfaction to congratulate gas managers generally upon the remarkable ability, ingenuity, conscientiousness, and business-like organization and energy of the gas-meter makers. Without their labour and skill it would be impossible to bring any gas undertaking under the same scientific observation and direction as at present, and if our brethren of the water companies could have anything like the same assistance it would be hailed by them as almost inaugurating a new era in the history of their undertakings.

So much has the importance of the gas-meter been felt, that most of the suggestions, either for new instruments or for modifications of existing instruments, have come from distinguished gas engineers, and I have only to mention the names of Samuel Clegg, the "father of gas lighting," John Malam, Alexander Wright, William Esson, Alexander Angus Croll, and, though last, not least, our indefatigable friend William John Warner, to satisfy you that nothing can be farther from my mind than to make invidious distinctions. And, in the third place, while I am permitted to mention the results of the working of companies other than my own, I do not wish to institute comparisons. The conditions under which different undertakings are conducted vary so much that no comparison between them can properly be instituted, and I therefore propose to use the facts of each case with this reservation.

It so happened, about the years 1860 to 1863, that for some reason or other the directors of the Portsea Island Gaslight Company refused to supply dry meters to their consumers, and the indefatigable representative of a London meter-maker, seeing his opportunity, so used the *argumentum ad hominem*—which, broadly stated, was that, when the gas company make a rule, it must be *a priori* bad for the consumer—that in a short time the whole district had a firm conviction that the wet meter was the company's instrument for extortion, while the dry meter was the consumer's salvation. The personal argument thus employed was greatly supported by reference to the consumer's personal convenience—a feeling existing among consumers to this day. To the consumer the question of convenience assumed this form: To keep the wet meter in order, it had to be placed on a level shelf, in the lowest part of the premises, so that condensation might flow into it; regularly, once in six weeks, a smart inspector called with a dirty satellite behind him, armed with pincers, filler, and water-can; water was called for, poured in, and drawn off; plugs were left slightly leaking, while an unpleasant odour—partly from the water, partly from the gas, partly human—lingered about the basement. Occasionally the supply stopped suddenly, just as a dinner party was about to assemble, and the host, instead of meeting his friends, had to tuck up his sleeves and set to work "watering," or at Christmas time "thawing" the meter; and to add insult to injury, sometimes when the quarter's registration was unusually small, there might be a suggestion that the water had been drawn off, or the meter was "non-registering." To have a dry meter seemed to be in paradise compared to the innumerable ills which the wet meter seemed heir to—the wet meter so highly recommended by the gas company.

I was, therefore, not at all surprised, when I joined the company in 1863, to find that the use of wet meters was impracticable, at least, for a time; and I was thus led, from a manager's point of view, to consider whether it were possible to satisfy the consumer, on the one hand, by giving him the use of a dry meter, and, on the other hand, to obtain for the company payment for a sufficient quantity of gas per ton of coal. A prejudice in the minds of consumers is as much a *fact* in the calculations of the manager, as popular tendencies and impulses are in those of the statesman; and promising undertakings have, before now, been wrecked from their promoters omitting to take prejudice into account. If giving way to prejudice were injurious to the company in the long run, it would be equally injurious in the long run to the consumer, and it would have been my duty, at all hazards, to oppose it; but I had to inquire how far that injury, assuming it to exist, might be avoided or lessened. And the results of that inquiry, extended now over 12 years, have led me to the conviction that the use of dry consumers meters can be made, by a system of periodical testing, to satisfy the gas manager's wants, which I take to be—good returns for his manufacture, in the first place, and satisfaction to his customers, in the second. As a gas engineer, I may desire something scientifically accurate and reliable, and, for all scientific registration, no one can deny the wet meter is the only instrument at present available; but in the daily concerns of life we do not look for scientific accuracy, and, indeed, are prepared to sacrifice a good deal of it for the sake of easy working. I dare say I may be offending many advocates of dry meters by refusing to them this claim of scientific accuracy, but it is not my intention here to discuss the merits of either system. For the purposes of consumers registration I want, not what a gas engineer, intent only upon his manufacture and apparatus, wants, but what a gas manager, with all the responsibilities of administration upon him, needs; and I shall, therefore, confine myself to showing—1, That the company's advantage and the consumer's convenience are both possible under a system of dry meters; and, 2, That, while all meters should be systematically tested, in the case of dry meters it is imperative.

It is pertinent to the consideration of the first point that in Portsea, in 1863, where wet meters were mainly used, the unaccounted-for gas averaged 24 per cent. on the quantity made, and the sale of gas per ton of coal only 7100 cubic feet. Last year (1874), with dry meters the unaccounted-for gas was only 5·07

per cent., and the return per ton of coal was 9030 cubic feet. I do not assert that the whole of this improvement is due to the meters having been maintained in good condition, because I know part of it is attributable to a thorough overhaul of the mains and services undertaken in 1864; but my point will be illustrated by the returns of sales of gas per ton during the past six years, when nothing but systematic testing has been relied on.

PORTSEA ISLAND GASLIGHT COMPANY.

Return of Gas Unaccounted for from 1869 *to* 1874.

Year.	Made.	Sold.	Unaccounted for.	Per Cent.
1869	213,796,000	189,985,000	23,811,000	11·13
1870	225,422,000	201,496,000	23,926,000	10·6
1871	234,091,000	216,827,000	17,264,000	7·37
1872	241,595,000	223,312,000	18,283,000	7·56
1873	250,945,000	234,936,000	16,009,000	6·37
1874	256,440,000	243,430,000	13,010,000	5·07

It is only fair to these returns to add that this so-called unaccounted-for gas includes the gas used in the retort-houses, works, and offices, and, bearing this in mind, it corroborates what was estimated many years ago by Mr. Hawksley in the arbitration case of *Methven v. The Portsea Island Gaslight Company*, and adopted by myself at the time, that, assuming the gas to be measured at the works at ordinary temperatures, and the mains and services to be in good condition, the loss between the works production and the totals of the rental ledgers, will not exceed 5 or 6 per cent., and any excess beyond this should normally be attributed to imperfect registration. I say "normally," because most of the results tabulated by Mr. Field, in his valuable analysis of the accounts of the metropolitan gas companies, are in excess of the per centage here stated; but the comparison between the London companies in recent years and my company, would manifestly be unfair, for while the Portsea Company has been pursuing the even tenor of its way under normal conditions, the London companies have either been in process of amalgamation, or their extensions have been on so large a scale as necessarily either to interrupt a steady administration, or to cause a certain amount of positive loss of gas. And what holds good of the London companies, holds good, no doubt, of others. But what I wish to impress upon you is this, that at Portsea we have been able to obtain, with a system of dry meters for consumers registrations, a result which, from the gas manufacturer's point of view, is satisfactory—a result beyond which, so far as registration is concerned, I do not think we should be eager to go.

Knowing, as I do, that many of my professional brethren hold that the sole use of dry meters, while possibly a concession to the prejudice of the consumer, is injurious to the company, I have endeavoured to gather from others, in a similar position to my own, what their experience has been. I am indebted to my friend, Mr. Field, the able accountant to the Imperial Gas Company, for some facts connected with that important company's working. Out of over 70,000 consumers meters in their district, only 15 meters are wet, all the rest are dry—the result partly of approval of the dry meter, and partly because it gives satisfaction to the consumer. For some years they went upon the usual plan of testing only those meters which were taken down in the ordinary course, or of which complaints were received; but in 1869 the system of periodical testing was introduced, and the result has been, that whereas the average unaccounted-for gas for the six years prior to 1869 was 15·4 per cent., since that date the average has been only 9·4 per cent.

It seems to my mind, therefore, clear that it is practicable for a manager to rely mainly upon dry meters for consumers, although I by no means imply that wet meters will not afford equally satisfactory results. In corroboration of this position, I am informed that the Ratcliff Company have dry meters throughout, and their sale of gas per ton of coal last year was over 9400 cubic feet. The Commercial and Independent Companies have principally dry meters, and their returns are both creditable. It is, therefore, for the manager himself to determine whether the feeling, prejudice, convenience, or call it what you will, of his consumers shall influence him, or whether he thinks their disadvantages such as to justify him in disregarding sentiment.

Where wet meters are used for consumers, a periodical examination becomes almost a matter of necessity. The frequent watering, to avoid sudden extinguishing, causes the meter constantly to come under observation; and though, thanks to the admirable contrivances of recent years, this frequency is much diminished, the necessity for water at regular intervals prevents much irregularity. Yet, even in the case of wet meters, or a mixed system of wet and dry meters, a systematic testing is of the greatest advantage. It will be fresh in the memory of the members that, at the period of the first Chartered inquiry, in 1872, considerable surprise was manifested in the House of Lords when Lord Redesdale called attention to the enormous amount of so-called waste of that company, the return of gas sold per ton of coal being no more than 7725 cubic feet. Since that date the directors have instituted a system of testing all their meters, which has not yet reached the whole district; and though, no doubt, much of the improvement is due to new works and mains, especially the magnificent Beckton station, yet it is satisfactory to observe that an increased sale of gas per ton has accompanied the systematic testing, the quantity in 1873 having been 8060; in 1874, 8839; and I am told it will this year exceed 9000 cubic feet.

But if a system of periodical testing be desirable in the case of wet meters, in the case of dry meters it is absolutely imperative, and I shall hope to satisfy you that there is no uncertainty as to the result if a proper method be adopted. So far as the Portsea Company is concerned, it will be sufficient to take the results of the testings from Jan. 1, 1873, to April 30, 1875, a period of 2¼ years.

Of 5600 meters, representing 30,017 lights, which have been tested during that period—

4203 meters, representing 23,059 lights, were "correct" within the limits of the Sales of Gas Act;
658 meters, representing 3060 lights, were "fast," or against the consumer;
274 meters, representing 1449 lights, were "slow," or against the company;
131 meters, representing 633 lights, were "stopped;"
132 meters, representing 793 lights, oscillated;
202 meters, representing 1023 lights, leaked in the index-box or case.

This will be better seen by the following per centages:—

76·8	Correct.
10·0	Fast.
4·8	Slow.
2·1	Stopped.
2·6	Oscillating.
3·7	Leaky.
100·0	

Of the meters marked as being "fast," only 105 were over 6 per cent. error, and of the meters marked as "slow," only 101 were over 6 per cent. error; so that what the company lost by meters not registering sufficiently was made up by nearly the same number registering in their favour, and in very few cases was the error sufficient to be a serious matter to the consumer. All practical working in life must proceed on the principle of compromise, and where the error is reduced to so low a minimum it is as much as can be reasonably expected. Another curious point in connexion with these results is the undesirability of adhering solely to one manufacturer. The firms that have supplied the Portsea Gas Company are—[For obvious reasons the names of these firms are omitted here and elsewhere. They may or not appear in the "Transactions" of the Association]—with a few meters from other makers, mainly for the purposes of experiment and comparison. While all of these firms have supplied first-class meters, their *tendencies* as to error are very marked.

PORTSEA ISLAND GASLIGHT COMPANY.

Meters from Different Makers for 2¼ *Years to April* 30, 1875.

—	Total.		Correct.		Fast.		Slow.		Stopped.		Oscillating.		Leaky	
	Meters.	Lights.	Meters.	Lights.	Meters.	Lights.	Meters.	Lights.	Meters.	Lights.	Meters.	Lights.	Meters.	Lights.
A. and Co.	2017	12,423	1660	10,278	86	529	104	650	52	264	64	407	51	295
B. and Co.	1562	7,948	1172	6,069	267	1191	31	176	24	116	21	164	47	232
C. and Co.	1080	5,641	763	4,059	111	556	83	399	14	90	38	189	71	348
D. and Co.	633	2,580	441	1,806	128	514	29	116	18	70	5	19	12	55
Other makers	308	1,425	167	847	66	270	27	108	23	93	4	14	21	93

Per Centages.

	Total.	Correct.	Fast.	Slow.	Stopped.	Oscillating.	Leaky.
A. and Co.	100	82·7	4·2	5·2	2·1	3·3	2·5
B. and Co.	100	76·4	15·0	2·2	1·5	2·0	2·9
C. and Co.	100	71·9	9·9	7·0	1·6	3·3	6·3
D. and Co.	100	70·0	20·0	4·5	2·7	0·8	2·0
Other makers	100	59·4	19·0	7·6	6·5	1·0	6·5

The accompanying table shows that while the meters of A. and Co., within their very narrow limits of error, have a tendency to go "slow," those of the other three makers have the opposite tendency, a circumstance which arises probably from some diversity of material or method of manufacture. But it cannot but be gratifying to gas managers to find that so much success has been obtained in the production of a delicate instrument measuring so subtle a fluid as common coal gas. I am again indebted to Mr. Field in being able to present to you a statement of the results obtained by the Imperial Company in their testings for 1872, 1873, and 1874, remembering that all these are dry meters.

IMPERIAL GAS COMPANY.

Result of Re-proving Meters for the Years 1872, 1873, *and* 1874.

	1872.	1873.	1874.
Number of meters belonging to company.	64,530	68,489	71,380
Number re-proved	10,822	10,607	14,182
Number found to register correctly	3,045	2,704	3,702
Number found to register slow	1,969	1,818	2,413
Do. stopped	640	646	966
Do. to register fast	1,857	1,900	2,737
Do. with other defects	3,311	3,539	4,364
Total defective	7,777	7,903	10,480
Per cent. on number re-proved—			
Correct	28·33	24·68	26·51
Fast	14·44	16·03	21·52
Slow	18·61	18·50	14·20
Stopped	9·82	8·19	8·22
Other defects	28·80	32·60	29·55

From this return it would seem that the proportion of defective meters was somewhat large; but the nature of the defects for which meters were condemned to be readjusted was so trifling, showing the rigidity of the examination, that Mr. Field invented an ingenious way of determining whether the total error of the defective meters would materially affect the rental. To do this, he ascertained that the rental of the Imperial Company averaged about 14s. per meter light per annum; and then by calculating the amount of error on each defective meter, he arrived at a sum which might be taken as the total loss or gain according as the meters were slow or fast. The difference between this estimated loss and gain might, therefore, be considered the total effect on the rental by the sum of the defective meters. In this way he ascertained that the total influence on the rental by defective meters was—

In 1869	·051 per cent.	In 1872	·013 per cent.
,, 1870	·034 ,,	,, 1873	·011 ,,
,, 1871	·015 ,,	,, 1874	·002 ,,

And he also satisfied himself that while dry meters were thoroughly reliable, the system of periodical testing had a perceptible effect in bringing the area of error into almost invisible proportions.

I have only now to describe to you the actual method I have adopted, and which, though possibly not adapted to other circumstances, I have found to answer fairly well for a good many years. The first thing I had to determine was how often each meter should be examined. The Imperial Company make their rule once in six years, but I soon satisfied myself that a more frequent inspection would be beneficial, if only from the necessity of keeping the cases painted, because I need hardly say that, unless dry meters in tin cases are frequently painted, spots of rust show, and, in a short time, holes are found, which may destroy the meter altogether; and, therefore, in the interest of the meter's life, I required a more frequent examination. I, therefore, fixed the period at three years, mainly for the purpose of painting; and, as the fitters were not so hard worked in the summer as the winter, I made it a summer duty of the inspectors to keep their men employed. And, that there might be a check upon the work, I fixed upon a distinctive colour for each year, so that the inspectors would know, from the colour of the meter at the time of quarterly inspection, whether the meter had been taken down and painted within the specified time. I have on this plate a list of these colours, and I express a strong opinion as to the advantage of the colour method.

It soon, however, became clear to my mind that, relying upon the uncertain leisure of the ordinary inspection, fitters would not meet the object I had in view, which was a systematic examination, and I therefore detailed for the duty a special fitter and his labourer, moving him from one inspector's district to

another, when the whole of that district's meters for the year had been examined. His duty is simply to take down the meter, fix another in its room, and bring it back to the testing-room, where it is examined, and, if correct, painted the proper colour for the year and reissued. We have a separate tester, whose duty also is to test the quality and purity of the gas, and be present at the daily visits of the public testing officer, as required by the Gas-Works Clauses Amendment Act, 1873. We find that, on the average, this testing fitter can manage ten meters a day, or about 3000 meters a year, and as we have a little over 6000 meters in all, he manages to test every meter once in two years, though as the number increases this period will also slightly increase. I had intended furnishing the association with an analysis of the yearly per centages of error, but it may perhaps be more usefully placed in the appendix, as this paper is already too long.

I will, however, briefly recapitulate what I wish to convey in this paper.

1. That while wet meters are more scientifically correct, there is a prejudice among consumers, at least in some districts, against their use, on the ground of inconvenience.

2. That a gas manager has to take these prejudices into account, and may be inclined to humour the consumer by supplying dry meters.

3. That dry meters, with certain precautions, can be made to meet the gas manager's needs, which are a proper return to the company and satisfaction to the consumer.

4. That while all meters should be periodically examined, it is imperative that with dry meters there should be a system of testing, and if that system be followed the per centage of error will be practically inappreciable.

5. That this system of testing should provide for the examination and painting of each meter at least once in every three years.

6. The obligation applies to all companies, whether large or small, in their own interest, as well as in that of their consumers.

Mr. JOHNSON (London) said he had been much pleased with the paper read by Mr. Douglas on this question, and, though he did not agree with him *in toto* in his statistics, he did agree in the statement as to the difficulty which gas managers had to encounter with regard to dry meters. He had had to face some enormous difficulties himself, seeing that since the amalgamations effected by the Chartered Company, with which he was connected, he had had to take over a large number of dry meters from other companies. In the eastern district of the Chartered, of which he had the charge, there were about 25,000 meters, and of these 19,000 or 20,000 were dry meters. During the last three years he had been doing what Mr. Douglas had been doing at Portsea, and he would give some results of his investigations. In the period referred to he had tested 10,500 dry meters, and of that number only 48·77 per cent. were found correct. Out of these 10,500 meters there were 2728, or 25½ per cent., fast. The average per centage of error of each was 4·44. Then there were 2300, or 22·6 per cent., that were slow, their average per centage of error being 8·21. But a more serious error than that was discovered, especially in large meters. He believed that dry meters, up to ten lights, were sufficiently correct for use, and might be depended upon, supposing them to be periodically tested. But he had found 1050 out of 10,500, or 10 per cent. of them, which, in the aggregate, passed 15,606 feet per hour before they began to register at all. In his district there was a large number of meters in buildings where there was a considerable day consumption of gas, and he found that this consumption had been going on at the entire cost of the company, the large dry meters allowing 1, 4, 5, up to 20 and 50 lights to be used without any registration at all. With those facts before him, he could not endorse all that Mr. Douglas had stated as to the fair accuracy of dry meters as means of registering the quantity of gas consumed. During the time he mentioned he had tested 1300 wet meters, and he found the per centage correct was 91·40, as against 48·77 of the dry class. The fast meters were 42, or 3·39 per cent., as against 26 per cent. of fast dry meters., the per centage of error being 2·95, which was as close as possible within the range of the Sales of Gas Act. Referring to the slow wet meters, he found there were 2·71 per cent., the average per centage of error being 4·81; so that, in point of fact, all the wet meters taken down were, except as to a slight per centage, within the Sales of Gas Act. Now, with regard to the question generally, he agreed entirely with Mr. Douglas that it was most material dry meters should be continually taken down and tested. But there was this difference with regard to dry meters, that though they might secure comparative accuracy by continually examining them, the cost of doing so was a somewhat serious expense in the working of the company. As far as his own company was concerned, the effect had been wonderful, but no doubt they had a great number of very old meters, and that would affect considerably the results obtained. He had before him a paper which gave the results of the testing of dry meters in 1873, which showed that only 38 per cent. of them were correct. There were 28½ per cent. of fast meters, the per centage of error being on the average 4·50, and of slow meters there were 30·69, their average per centage of error being 12·92. The result of all his experience was to justify him in saying, "Guard against three-diaphragm meters, or three-valve meters, for the valve was the great cause of error;" and he thought this accounted for the difference between the per centages in the two and three valve meters. He considered that the cause of about 2 per cent. of the unaccounted-for gas in his company had been thus ascertained by the experiments of the last two years—*i.e.*, the per centage which was shown when the meters were fully at work; but as they had reduced their unaccounted-for gas in that time from something like 17 per cent. to 8 or 9 per cent., there was evidently a much greater element of error, and that was in the aggregate consumption which it was possible to get through these meters. In this way an immense quantity of gas was lost where large meters were used. The wet meter was undoubtedly the most accurate instrument, it could always be depended upon, and he scarcely knew an instance in his experience, with the 1000 or 2000 he had tested, in which a wet meter had allowed gas to pass unregistered.

Mr. WARNER (South Shields) desired, in the opening of his remarks, to acknowledge very warmly the high compliment which the committee had paid him by awarding him a premium for his last paper. He wished also to express his obligations to the president personally, for the very high terms in which, in his inaugural address, he had spoken of the patented meter by Warner and Cowan. And to this he would add his thanks to Mr. Douglas for the kind manner in which his name was mentioned in the paper just read. With regard to the question dealt with in the paper, he thought it would be remembered that some time since he drew the attention of managers to the necessity of periodical testings. He therefore could not but confirm all that had been said by Mr. Douglas on the importance of this subject. It would be recollected also that he had before now drawn attention to the importance of the relative sizes of meters in connexion with the capacity required by the consumers. He need not say what kind of meters were used at South Shields, but he might state that he had been so far actuated by the spirit of Mr. Douglas's paper, that there had not been one order for Warner and Cowan's meters in the town. Indeed, there were very few wet meters at all. He had therefore had much to do with dry meters, and as dry-meter makers guaranteed their instruments for five years, it might fairly be assumed that that was the duration of a dry meter before requiring repairs. He had taken 100 of these meters for the purpose of testing—viz, 25 2-light, 25 3-light, 25 5-light, 15 10-light, and 10 20-light. These meters were manufactured by nine different makers. Of maker No. 1 there were 40; No 2, 20; No. 3, 18; No. 4, 8; No. 5, 7; No. 6, 2; No. 7, 2; No. 8, 2; and No. 9, 1; They were all subjected to varying pressures and varying rates of consumption. The inspector was sent round to take 20 meters each year, and the tests to which they were subject were—1st., the normal rate of consumption for which they were adapted; 2nd., an increase of 25 per cent. on normal lights; and 3rd, an increase of 50 per cent.; the pressures varying from 5 to 15 and 25 10ths. They were also tested at 1 foot, 3 feet, and 5 feet per hour consumptions at 5-10ths and 25-10ths pressures, and the results were as follows. In 1870 there were 20 meters tested with normal lights and 5-10ths pressure. Of these, one did not register, two were absolutely correct, five were 3·38 per cent. slow. In 1871 the number tested was 20—of these, one did not register, one was 3·09 per cent. fast, three were 1·46 per cent. slow. In 1872 the number tested was 20—of these, two were absolutely correct, three were 3·83 per cent. fast, and one was 2·44 per cent. slow. In 1873, 20 meters were tested, and of these, two were 1·01 per cent. fast, and three were 1·32 slow. In 1874, 29 meters were tested; one was correct, two were 1·27 per cent. fast, and two were 13·00 per cent. slow. The average of the 100 meters so tested was as follows. In 1870 there were 8 2·40 per cent. fast, and 11 3·11 per cent. slow, 2 did not register, and 8 were correct. In 1871, 8 were 1·65 per cent. fast, and 8 were 2·51 per cent. slow. In 1872 there were 13 2·57 per cent. fast, and 6 were 1·68 per cent. slow. In 1873 there were 13 1·38 per cent. fast, and 5 1·47 per cent. slow. In 1874 there were 11 2·18 per cent. fast, and 7 5·12 per cent. slow. The result of these experiments showed that for every 1000 cubic feet of gas passed through those meters there would have been registered in 1870 only 942 feet; in 1871, 946 feet; in 1872 there would have been 1011 feet; in 1873, 1005 feet; and in 1874 only 994 feet. The average per centages of error were therefore in 1870, 5·75 per cent. slow; in 1871, 5·35 per cent. slow; in 1872, 1·11 per cent. fast; in 1873, 0·53 per cent. fast; and in 1874, 0·60 slow. The average of the whole of these tests gave the quantity of gas registered 980 feet for every 1000 feet passed through, which was equal to 2 per cent. slow. This was with a consumption at the normal rate. Passing one foot per hour at 5-10ths pressure in 1870, every 1000 feet of gas would be registered as 882 feet; in 1871 as 881 feet; in 1872 as 923 feet; in 1873 as 983 feet; and in 1874 as 876 feet. But this was not all, for, as Mr. Johnson very properly remarked, there were some which did not register at all. In this case there were seven not registering. The average of those that did register in 1870 showed 11·32 per cent. slow; in 1871, 11·94 per cent. slow; in 1872, 7·65 per cent. slow; in 1873, 1·70 per cent. slow; and in 1874, 12·41 per cent. slow. The average result of the whole was that only 909 feet of gas were registered for every 1000 feet passed through these meters, the average per centage of the whole being 9·10 slow. These were results obtained with only 100 meters. Mr. Johnson gave, as the result of an examination of 10,500 meters in 1873 and 1874, an average of 8·21 slow as against 4·44 fast, which showed a loss upon the whole of 4 per cent., as against his (Mr. Warner's) figures of 4·37 per cent. on the smaller number. He did not think there could be more complete evidence on the point than the experience Mr. Johnson had given them. With regard to the results he had himself mentioned, he would state that the testings were not made by him, but by a person who had been with him for some years, previous to which he had been with one of the largest meter makers.

Mr. BARRATT (Grantham) said this subject was of such vital importance to all gas managers that he thought every one present should contribute his modicum of information to the general fund. He did not speak merely as a gas manager, but as having been a meter tester for five or six years for the Corporation of Leeds. During that time, 10,000 meters, wet and dry, passed through his office. A long time before he left the service of the corporation, his faith in dry meters had entirely disappeared, for he never found one dry meter that would register the same under all circumstances. Take a two or three light meter, and test it under 5-10ths pressure, and it might be found to register within 5 per cent. of the quantity it was marked to pass; but pass through that meter from 12 to 18 feet of gas, and it would vary. If 18 feet were passed, it would be from 5 to 6 per cent. slow; if the same quantity of gas were passed through at a slower rate, it would be found to be what it was alleged to be when sent out from the manufactory. On one occasion he wrote to Mr. Joseph Adamson, one of the first presidents of this association, stating that there was not a dry meter that had come under his own observation through which he could not get as much gas, without any registration, as that meter was sent out to pass. This statement was communicated to a dry meter maker, who came to him and said he would undertake to make a 10-light test meter that should be absolutely correct under all circumstances. This was arranged accordingly, and a clause was put in the agreement that the meter was not to be paid for until certified by him (Mr. Barrett) to be correct. The meter came down, and was put through several tests; but, before the testing was over, there was a variation of registration, as against the gas company, of no less than 7½ per cent. The firm never were paid for the meter, and that meter was still in his possession. He had been in his present employment for about 12 months. When he first went to Grantham, he tried to ascertain the leakage in the place, and, to his astonishment, found it to be 25 per cent. He was certain that this 25 per cent. could not go through the mains in the streets, and he, therefore, proceeded to discover the proportion of dry meters to wet throughout the town, when, to his great sorrow, he found that he was up to his shoulders in dry meters. At Christmas last he took the inspector's book, and found no less than 20 meters standing, which had not registered anything for the three months previously. He then went to the rental, and found that there they had not registered one-half the consumption of the prior quarter. At the close of the next three months, the inspector's book showed that 10 more meters had stopped, so that, out of about 1400 meters, there had been stopped, in six or nine months, no less than 30. He followed the last-named meters backwards, and found that they had been like their fellow-meters in the quarter before they stopped. On the other hand, he must mention that, during the whole of that time, very few wet meters had come under his notice which were not within 2 or 3 per cent. of being correct.

Mr. HARTLEY (Westminster) said that in a paper which he had the honour to read before this association, at its meeting in Dublin, he remarked that the meter, whether wet or dry, was so admirable a machine, did its work so well, generally, and really required so little attention, that it appeared to be forgotten sometimes by those who used it—that, like all other instruments, the result of man's ingenuity, it was subject to defects, and required supervision at times. In the paper referred to he (Mr. Hartley) had indicated the importance of periodical examination, and it had afforded him much pleasure to listen to Mr. Douglas's able paper on the subject. The discussion had turned upon the question of wet *versus* dry meters, but it seemed to him that the proposition of Mr. Douglas was, how to use meters with the greatest advantage, so as to secure something like true measurement, the fact of the meters used by Mr. Douglas being dry, being due to circumstances. His (Mr. Hartley's) predilections in favour of wet meters were pretty well known; he should not, therefore, be suspected of standing up as a prejudiced advocate of dry meters; but he thought Mr. Douglas's figures showed that, in spite of all defects, it was possible to use dry meters under conditions which would give a fair return. This, indeed, was manifest from the statement made by Mr. Douglas that his leakage was only 5 per cent. It was difficult to say in what direction they were to look for the tendency to error in these instruments, because it was a fact in his own experience that meters of different makers had a tendency, some to become fast and some to become slow. There were two classes of leather used by different makers, and it might be that something of the cause of error thus arose. But this did not seem very material, because probably the average in one direction would be found about equal to that in the other; but, at all events, it had a bearing in this respect, that gas managers would prefer meters to be fast rather than too slow. With regard to stopped meters, it had been his (Mr. Hartley's) fortune to have many meters sent back to him from one company, which had stopped, and he had found the fault to be due to

the action of the gas itself. In the district of that company, the whole of the pipes had been fitted into the consumers houses to suit wet meters—*i. e.*, they had a fall towards the meter. As a consequence, the meters had a considerable quantity of liquor in them, and this was the cause of their defective action. The great lesson of Mr. Douglas's paper was, that it was possible to use any class of meters under due inspection, and bring down the leakage to the lowest rate.

Mr. ELDRIDGE (Richmond) said he had nothing but dry meters in use; he had been connected with the works 20 years, and his leakage had never reached 10 per cent.

Mr. D. BRUCE PEEBLES (Edinburgh) said he thought the question of wet and dry meters had been thoroughly and fully discussed and settled in the minds of all gas managers for a long period of years. There was no man who had given any attention to the subject, or who had studied the peculiarities of the two classes of meters, who would assert that the dry meter could be as confidently relied upon as the wet. The nature of the material of which the former was manufactured precluded the possibility of its being so. They all knew what leather was, and how it was affected by different kinds of temperature, according to the place the meter occupied in the consumer's house, and how shrinkage or stretching might sometimes, where heavy pressure was acting upon it, tend to make the meter travel faster or slower. He knew of many instances in which dry meters had been used by gas engineers or managers, not because they liked them, but because they felt themselves bound to adopt them. He did not mean to say that the entire agitation was justifiable, but it was certain that in many towns a prejudice had been got up in favour of dry meters, and whenever such an agitation existed and had reached the point so graphically illustrated in Mr. Douglas's paper, it was a very difficult thing to quell it. In Edinburgh, the seat of the wet meter manufacture, there were not, until within the last few years, any dry meters used at all. But the influence of dry meter makers had been brought to bear in that city, and a strong feeling had been created both in Edinburgh and Leith in their favour. They were accordingly sought after, and would be used in spite of the opinions of the managers of the two gas companies, who, though favourable to the use of wet meters, found themselves obliged to supply the public with dry. The paper which had been read gave gas managers a useful lesson, and suggested to them that they ought to utilize, as far as possible, and bring into successful operation, all the means in their power. Mr. Douglas, though having a liking for dry meters, had made the best of the circumstances in which he found himself, and his paper showed that he had mastered the position, and that even with the much "black-balled" dry meters he had obtained good and reliable results.

Mr. DOUGLAS (Waltham Cross) said there was a source of error in connexion with this subject which had not yet been mentioned. When wet meters were to be tested they were generally taken down, and removed to the stores for the purpose. There they were filled up to the proper water level, and the result was very different to what it would have been had they been tested where they stood. For several years he made a point of having them tested where they stood, and he had found as great variations in this class as in the dry meters. For his own part he would not, unless compelled to do it, put up a dry meter where the consumption was over 60 lights.

Mr. HELPS (Bath) said he represented a company who had about 7000 meters in use. They were under the same difficulties that Mr. Douglas experienced; they let out meters on hire, but did not supply dry meters. An agitation, however, was got up in favour of the latter, the consumers thinking they were better instruments than the wet meters, because the company did not have them. The consequence was they had now about 4500 wet and 1500 dry meters. He was not complaining with reference to leakage or unaccounted-for gas, because their last return to March showed that the leakage was only between 5 and 6 per cent. But there was another question involved in the matter, and that was the labour question. He had no hesitation in saying that his company had more trouble and expense in reference to stopped meters among the 1500 dry meters than they had with the 4500 wet ones. During the last six months, the trouble and worry they had had with stopped dry meters was something more than he could tell. Sometimes the thing had been continued for two or three quarters without attracting the notice of the inspectors. There was not only the loss thus occasioned, but the discontent engendered amongst the consumers, who could hardly be got to believe they had had gas which was not registered.

Mr. KEY (Accrington) said he thought there was one point to which the attention of managers should be directed, and that was the custom of keeping meters in houses after the consumers had ceased to use gas, with the water at the level. It was a false economy to charge a rent for meters when not in use.

Mr. H. WOODALL (Leeds) thought there had been one point overlooked in the paper. Mr. Douglas said that some years ago his leakage was 24 per cent. By a thorough overhauling of his mains and service-pipes he had brought his leakage down to 11 per cent., and afterwards, by giving special attention to his meters, he had reduced it to 5½ per cent. Now, so far as he (Mr. Woodall) could make out, the per centage of meters fast counterbalanced, so far as the income of the company was concerned, the per centage of meters slow; therefore, no reduction of leakage would result from this cause. To his mind it seemed plain that the reduction from 11 to 5½ per cent. was due to the larger quantity of gas supplied through the existing mains. Supposing Mr. Douglas had 100 miles of mains in existence in 1867, and only 100 miles now, and yet distributed through the same length of main 50 per cent. more gas, it would account for the whole apparent reduction of leakage.

Mr. WATSON (Sydenham) said he could endorse the statement made by Mr. Woodall with reference to leakage. Mr. Douglas was good enough to mention that Mr. Jones's leakage was only 5 per cent. But any one who knew the Ratcliff Company's district knew that it lay in a nutshell. He (Mr. Watson) supplied a district eighteen times larger than that of the Ratcliff Company, and the rental was nearly equal; so that if his leakage, taking one year with another, was 7½ per cent., what ought Mr. Jones's to be? This was a very important matter, and, in discussing the question of leakage, it must not be lost sight of, because a great deal depended upon it. Take a district supplying 200 million feet of gas per annum; this was often done with 50 or 60 miles of main, whereas in a suburban district the same quantity of gas was distributed through 100 or even 140 miles of main. Where the population supplied was dense, and the district compact, the leakage ought to be less.

Mr. FOULIS (Glasgow) said he had in this city something like 160,000 meters, 75,000 of which were under two lights each. Five years ago he had no less than 20,000 dry meters, numbering nothing. Half his meters were wet and half dry, and he was perfectly certain that, for every single wet meter taken down for non-indication, he took down 10 dry meters. During every inspection 30 or 40 dry meters were brought in daily, simply for doing nothing, though very often the mere shaking of them would make them all right. He had no hesitation in saying that small-sized dry meters were a very great source of loss.

Mr. DOUGLAS, in reply, said he felt much gratified that a paper, which he had thought of comparatively little value, except as giving the facts of his own working, had resulted in so lively and entertaining a discussion, and had brought out, what he so much desired at all their meetings, the exact facts of each one's individual experience. In this point of view the discussion was of considerable value; nevertheless it had necessarily—perhaps from its very nature—drifted away from the point of the paper to a large extent, and had embarked upon the question of the relative merits of wet and dry meters. Beginning with the observations of Mr. Watson, he remarked, with Mrs. Malaprop, that "comparisons are odorous." His (Mr. Douglas's) intention was not to institute a comparison between the Crystal Palace district and the Ratcliff Company's; and, though Mr. Watson was perfectly justified in defending his position, he would forgive the speaker for saying that he never attacked it. Then, as to the question raised by Mr. Johnson, who referred to 19,000 or 20,000 meters brought in from the old City Company, it did not touch the point of the remarks in the paper, which were as to the result of a series of testings that had been going on for some time—a periodical set of testings. Many of the meters which Mr. Johnson mentioned might have been without any examination for years. Taken in conjunction with Mr. Foulis's observations, he thought he might say that dry meters should not be very large or very small, but that, between three and 60 lights, it was possible to institute such an investigation as to ensure their acting tolerably well. Mr. Warner had discussed the question of dry and wet meters in a long series of statistics, which would be very valuable, and he cordially sympathized with him in the matter. Mr. Warner had conferred a benefit upon the whole of the gas-consuming community by his singularly able form of the wet meter. He (Mr. Douglas) had no hesitation in saying that nothing so able had appeared for many years as that which Mr. Warner had produced. Mr. Barrett's facts went to show that it was not possible to make dry meters correct. He thought the best course for Mr. Barratt to have taken at Grantham would have been to go to the expense of an apparatus to try and put the dry meters in order. There was much force in what his (Mr. Douglas's) father had said with regard to the mode of testing wet and dry meters. If a wet meter was tested in its place, a certain result would be obtained; but if it was emptied and taken home to the shop, the result was not so reliable. Mr. Hartley and Mr. Bruce Peebles had really touched the true point. He had no doubt, as Mr. Hartley had said, that the direction of error depended much upon the kind of leather used in dry meters. He (Mr. Douglas) had received letters from several gas managers bearing testimony to the advantages of systematic testing of meters, and he felt that he could not too strongly urge the matter upon the consideration of members. He agreed in the observations of Mr. Peebles. There were many consumers who, on the mere recommendation of the gas manager to have a wet meter, would instantly determine to have a dry one. There was no getting over this fact, which was patent to every manager's experience, and the only thing was to be prepared to meet the wishes of the consumer, and give him what he wanted, with the expression of opinion that the wet meter was the more reliable instrument; but if he insisted upon the other, the responsibility must rest upon himself. With regard to the question of cost of testing meters, it was after all a comparatively small matter to the advantage derived therefrom. Mr. Woodall seemed to think that the testing of meters at Portsea had not been the cause of the improvement in the per centage of unaccounted-for gas, and that the numbers of slow meters had been compensated by the number that were fast. He would only say to Mr. Woodall, and to gas managers generally, "Your first duty is to see that all your mains and services are in first-rate condition, not only as regards their quality, but also their size, so that the pressure may be brought down to a minimum; and the next step, if your leakage is not reduced, is to look to your meters."

The PRESIDENT, in closing the discussion, said he would not occupy more than two minutes. Referring to the object of Mr. Douglas's paper, he said it was not with the writer a question of wet *v.* dry meters, but of the importance of the periodical inspection into the accuracy of the working of whichever class of meter was in use, and he (the president) thought he had fairly defended his position, and that nothing had been brought forward in the discussion to interfere with the truth of his remarks. The question of the relative advantages of dry or wet meters was another matter altogether. Mr. Douglas's own experience fully demonstrated the importance to be attached to the system he recommended, in the reduction he had been able to effect in the per centage of his unaccounted-for gas.

Mr. W. CLELAND (Liverpool) read a paper on

ECONOMY OF FORCE IN GAS-WORKS.

This is a subject too large to be treated exhaustively in the time at our disposal. It extends from the time of bringing in of the raw material to delivery of gas through the governors, and from the occupation of the common labourer to that of the engineer. It branches into several sciences, and involves inquiries that can only be accurately answered by various series of exact experiments and calculations, for which I have had neither time nor opportunity. Only a small part of the subject, therefore, will be handled at present, and that somewhat loosely.

I begin at the main flue of the retorts, and the force that is continually escaping us in the hot gases from the retort-furnaces. A rough-and-ready calculation of the value of this waste heat, by the rules of chemistry and thermodynamics, will show the practical importance of the subject.

Take 10 lbs. of coke, and let us suppose, for the sake of simplicity, that it is pure carbon, that its combustion in the retort-furnace is perfect, and that just the necessary air is admitted to the furnace and flues. We should then have in the products of combustion—

Carbon	10·0 lbs.
Oxygen	26·6 ,,
Nitrogen (from the air)	89·0 ,,
Total hot gases	125·6 lbs.

Now the mechanical equivalent for absolute gases per thermal unit—that is the number of foot pounds of force contained in a pound of the gas for each degree of heat by Fahrenheit's thermometer—we may take to be the same as for air, and that, according to Rankin, is 130·3 lbs.; therefore, 125·6 × 130·3 = 16,365 foot lbs. is the mechanical value of the heat from 10 lbs. of carbon per degree Fahr.

The temperature of the hot gases in the main flue of a bench of retorts is, no doubt, very various in different works and at different times. It may be as low as a dull red, or 1000°; it may be as high as orange red, or 2000°. Much depends on the thickness and tightness of the flue walls and covers, and the character of the retorts and setting. To avoid any appearance of exaggeration, let us take the lower temperature, 1000°, and let us suppose 200° are lost on the way to the water, that not more than 200° of this heat pass into steam, and that the air finally escapes at about 600°, or the melting point of lead. Then we have 16,365 foot lbs. per degree, multiplied by 200° = 3,273,000 foot lbs., which, divided by 33,000, the number of foot lbs. per minute in one theoretical horse power, gives us 99-horse power. But it is found that the best engines do not deliver more than one-tenth of the theoretical power of the fuel, in the shape of effective horse power; therefore, 99 ÷ 10 = 9·9 is the effective horse power from the best engines, or say one-fourth of this, 2·475, from engines of the least economical type. Thus we get from 10 lbs. of coke 2½ effective horse power (within a fraction), or one-quarter horse power from each pound of coke. Assuming that we burn as little as 3 cwts., or 336 lbs. of pure carbon per ton of cannel or coal carbonized, and that the charge is four hours in the retorts, then ¼ H.P. × 336 = 84 H.P. per ton carbonized, divided by 240, the number of minutes in four hours = ·35 H.P. exerted for four hours continuously per ton of cannel carbonized. Assume the cannel carbonized to equal one ton per through retort per charge; this gives ·35-horse power continuously exerted per retort, or 100 through retorts will raise steam enough for a 35 horse engine.

If, instead of taking chemical equivalents, and the quantity of fuel consumed, as the fundamental data of our argument, we take the vacuum in the main flue and the area of its transverse section, so as to get at the quantity of hot

air actually passing in a given time, and work out our calculation as before, the result is still more remarkable. But as the figures I have given you are more simple, and quite sufficient for the purpose, I shall not go further in this direction at present.

In an article on "Exhauster Engines," in *Engineering* of May 21, 1875, we find the water evaporated per indicated horse power per hour 55 lbs., and water evaporated per pound of coal 9·2, equal 6 lbs. coal per horse power, ÷ 60 seconds, equal 0·1 lb. of coal per theoretical horse power, or per 33,000 lbs. raised 1 foot in a minute. So that the waste heat which we may confidently expect to pass into steam, according to our previous calculations, is just about one-fortieth of what has been obtained from fuel burnt under the boiler of a condensing engine. If you will consider for a moment at what a high temperature the hot air circulating around our retorts becomes useless for profitable carbonization, I think you will admit that this expectation is a modest one.

One of the most obvious means, and probably the most simple, by which this force can be utilized, is to apply the hot gases to the raising of steam for exhausting. In practice I have no difficulty in thus getting steam enough for exhausting by the jet, although the steam boiler, not having been specially constructed for that purpose, is badly suited to it, being a short vertical boiler with a single flue.

A saving in boilers from the steadiness of the heat, the small temperature differences, and the comparatively small amount of expansion and contraction, also a saving in stoking, and wear of furnaces and fire-bars, are among the economical advantages offered by this use of waste heat.

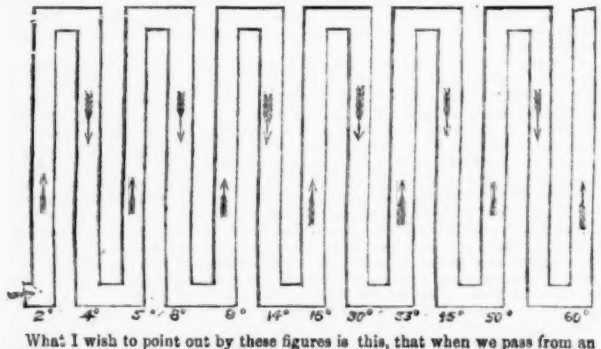
The boilers ought, of course, to be placed as near as practicable to the retorts. Descending flues, or any great length of horizontal flue, ought to be avoided, lest the draught of the retorts should be interfered with. Ordinary steam boilers may be used for this purpose, but the best description of boiler will be those that offer large heating surface, and but slight obstruction to the passage of the heated gases. Of those combining these qualities may be mentioned Cornish boilers, or vertical boilers, both with Galloway tubes, but so set that there shall be no return flues. But tubular boilers on the Root plan, which may be roughly described as a locomotive boiler reversed—the tubes containing the water, and the water space being the flue—are still better adapted to this purpose. The boilers should be so placed as to form of themselves a bye-pass flue, or part of the main flue, and be in the direct course of the hot gases from the retort arch to the chimney. Should this position, however, be deemed too inconvenient, or should the boilers pointed out be inadmissible, and the retort, draught suffer in consequence, part of the steam, applied at small cost to a jet in the chimney, will give all the draught required. The main flue from retort-bed to boiler, if of considerable length, ought to have thick walls and covers, or a casing of brickwork, with closed air space between, to save loss of heat by radiation.

Passing on to the condenser, we find a waste of force arising from the usual manner of arranging this apparatus, which I shall call the zig-zag plan. Suppose, for instance, that we have a condenser of 10 vertical columns, or 10 horizontal tiers of pipes, 20 feet long, in which the gas follows the usual zig-zag course, and that the resistance to the passage of a given production of gas through this condenser, or the pressure, vacuum, or force expended in its passage, is represented by 10. Now, if each of these columns, or tiers, is made a separate passage, or a separate set of passages, for the gas between the general inlet and outlet, and the gas is equally divided between the passages, manifestly, other things remaining the same, the speed of the gas in those passages, and consequently the force expended, will fall at least from 10 to 1.

But the real economy of force is much greater than this. We know that the resistance to the flow of gas, in pipes of equal diameter, is in proportion to the *square* of the speed. Now, the square of 10 is 100. The square of 1 is 1. We have, therefore, reduced the resistance from 100 to 1. But we know also that the resistance to the flow of gas through pipes of equal diameter, and under equal pressure (which, in this case, means equal difference of pressure between inlet and outlet), varies inversely as the square roots of their lengths. Now, the length travelled by the gas in the first supposed condenser may be taken as $10 \times 20 = 200$, while in the other it is 20. The square root of 200 being 14·142, while the square root of 20 is 4·472, we have here a further reduction, expressed thus:—14·142 : 4·472 :: 1 : ·032, so that our total reduction of resistance—that is, our reduction in the expenditure of force—is from 100 to ·032, or, roughly, to 1-300th part. Consequently we find in practice that, in condensers on this, which I may call the slow-speed plan, the difference between inlet and outlet pressure is so small that the usual pressure-gauges indicate no difference whatever.

To prevent inconvenient inequalities in the distribution of the main stream of gas through these down-pipes, the inlet and outlet are so placed that the distance travelled by the gas of each stream, between inlet and outlet, is exactly the same. The flow is further regulated by the throttle-plates at the bottom of the pipes, and, when necessary, by the throttle-valves at the top. We find no difficulty by these means in securing substantial uniformity of flow.

The "slow-speed" condenser is characterized by the strength of the ammonia liquor it delivers. That it *must* be so will appear clearly, if we consider the progress of the liquor in zig-zag vertical condensers. Suppose a vertical condenser of this kind discharges liquor of the average strength of 4° Twaddel, or 40-10ths, and that we take a sample of liquor from each of the columns separately, beginning at the inlet end. Of course, we shall have at the inlet warm and weak liquor, and at the outlet cold and strong liquor; the first much below the average strength, and the other much above it. But we shall find that the progress in strength is not regular, but proceeds, as it were, by jumps, somewhat as follows, the figures being 10ths of a degree Twaddel:—



What I wish to point out by these figures is this, that when we pass from an up-pipe to a down-pipe we have a considerable increase in strength, but in passing from a down-pipe to an up-pipe we have comparatively little. The down-pipes are, in fact, doing by far the largest share of work in purifying. The reason is obvious. In the up-pipes the chief production of liquor is in the lower half; it becomes warmer as it descends, and escapes from the pipe and from the gas by a short cut. In the down-pipes the liquor is formed most abundantly at the top, and it must travel the length of the pipe in contact with the cooling gas, itself becoming colder in its descent, and absorbing more and more ammonia. Make all the pipes down-pipes, and you have, of necessity, a more efficient condenser for liquor.

The superior efficiency of the slow-speed condenser, as a cooler merely, is due to the fact that the currents of air on the exterior, arising from the heat of the gas, are invariably upward; and the current of cooling gas being downward, you have the coolest air acting on the coolest gas, and *vice versâ*. As the heat of the air derived from the gas is in no part of its ascent greater than that of the gas it is acting on, it continues to extract heat along the entire length of every pipe. Moreover, the heat radiated by this condenser falls on surfaces of temperature nearly equal to itself, so that there is merely an interchange of heat of the same degree, and no warming of cold pipes by the heat from warm ones. Compare this with what takes place in the zig-zag arrangement.

If the condenser is vertical, you have at foot of the up-pipes cold air surrounding a warm pipe, ascending and distributing the heat along the pipe, giving back to the upper part, where we want it cold, a part of the heat it has taken from the lower portion. The effect from radiation is almost as awkward. The heat of the up stream radiates from the lower parts into the next pipe in advance, which we want to cool, while the heat from the upper parts of the down stream performs the same kind office for the next in advance. The horizontal zig-zag is not open to this objection as regards heat conveyed by circulation, but the effect of radiated heat on it is much the same as with the vertical arrangement.

In the slow-speed arrangement, the heat being at the top, is in the best position for being extracted by every breath of wind. But the utility of this arrangement will not be fully experienced until the condenser is enclosed in a building which shall protect it from the sun, and having ventilating passages, provided with shutters or valves, at top and bottom, will give us entire control over the temperature. Of course, any condenser may have its temperature so regulated, but extraordinary facilities for doing so are offered by the equal distribution of the heat along the top, and the vertical position of the pipes.

Horizontal condensers of the zig-zag type have the great advantage of keeping the liquor in contact with the gas throughout its course. Still they cannot equal the slow-speed vertical condenser in the strength of the liquor, and the reason is not far to seek. The liquor flows through the horizontal condenser in a stream, exposing its surface only to the gas; but in the slow-speed vertical condenser it flows in drops, or thin films, the condition most favourable to its solvent action.

The heat being confined to the upper part of the pipes, and the downward motion being very slow, time is allowed for the gas to circulate in slowly eddying currents, produced by changes of temperature and specific gravity. Thus in its course all parts of it are brought successively, and probably many times, within the direct influence of the cooling surface. Liquor is chiefly formed at the top of each pipe, but not rapidly, and as it glides in drops, or in a thin film, slowly down the interior surfaces, it has time to exert its solvent power on the ammoniacal salts, and by the time it is discharged from the syphon it is found to have attained a strength of 6 to 10 degrees of Twaddel's hydrometer, or 12 to 20 ounces. Thus the purifying power of the condenser, and the self-purifying power of the gas, are evoked and utilized to a degree not attained by any other arrangement known to me. The apparatus thus acts the part of a first or foul scrubber, and reduces proportionately the amount of *special* scrubbing required.

Following the gas to the exhauster and the scrubber, and taking these two together, we find prevailing methods still attended by unnecessary expenditure of force, both manual and mechanical. The steam-jet exhauster and steam scrubber are adapted to reduce this expenditure, and greatly simplify their respective stages of our manufacture.

Quoting from a former paper, "This invention may be called the direct-action method of exhausting and scrubbing gas by steam, because it aims at superseding, in *both* of these operations, the use of steam-engines, and of exhausting and pumping machinery, by bringing the steam into actual contact with its work, by enabling it to lay hold of its work directly, as one would grasp with his hand a weight to be lifted, and thus to perform its duty without the intervention of any machinery."

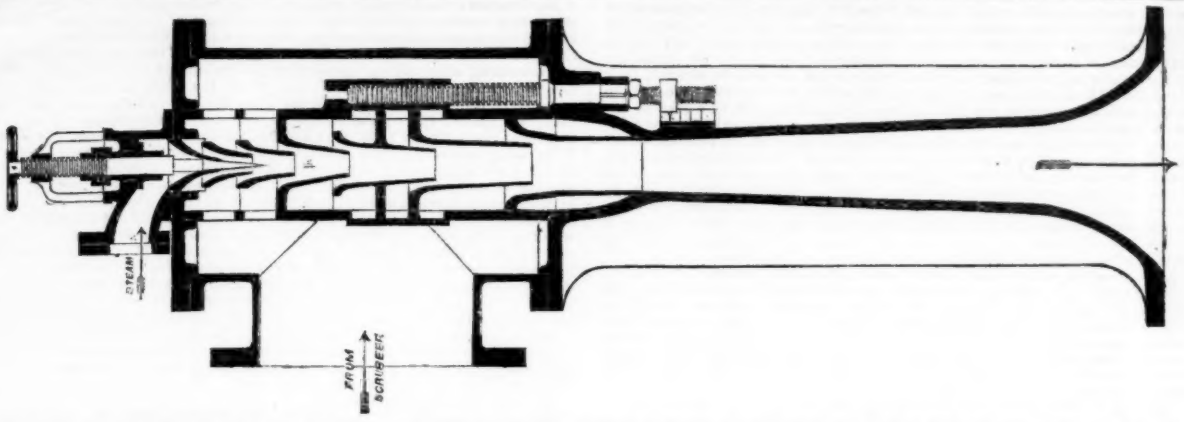
The action of the steam-jet exhauster is due to what is called lateral induction; but that term merely describes and gives a name to the phenomenon, without a hint of the cause. It is lateral induction; but what induces? To this I have met with no plausible reply, and I can only offer you a crude theory of my own—viz., that it is the attraction of cohesion in the moved and motive fluids, and between the two—in this case the gas and steam—assisted by their mutual diffusion, and also to *some* extent by condensation when the motor is condensable. I hear the action frequently compared to that of "Giffard's" injector, and at times it is spoken of as if the condensation of the steam were essential to the effect. Both notions are erroneous, as is proved by the fact that a jet of non-condensable fluid may be used for the lateral induction of an external non-condensable body of fluid of the same temperature.

We have here a longitudinal section of the Körting-Cleland steam-jet exhauster, the most approved form of this class of exhausters.

The most apparent advantages of the steam-jet exhauster are its small bulk and small cost, its simplicity, its noiselessness, its almost nominal expenses for attendance, tear and wear, and the remarkably steady vacuum it maintains. Both the flow of the steam and the inflow and outflow of the gas being continuous and unchanging, instead of being more or less intermittent, vacuum and pressure are continuous and changeless also. They are subject to little or no variation, except what arises from extraneous causes which affect all exhausters. This, of course, enables us to work safely at increased vacuum in the hydraulic main and reduced pressure in the retorts, with all the advantages attending this reduction.

The consumption of fuel is certainly not *greater* than in the great majority of engines now used for gas-exhausters. I am not, from my own experience, prepared to say that, in this respect, it matches steam-engines and exhausters with the latest economical improvements, but assuredly neither am I prepared to admit it will *not* match them. The truth is that I have never felt the fuel question to be one of primary importance in comparing the cost of steam-jet exhausting and scrubbing with that of other methods; not of the importance it would be in a comparison between different plans of engine-driven exhausting and scrubbing machinery. Consequently I have not hitherto gone to much pains either to establish the necessary, or reduce the actual, consumption of fuel. Experience shows the other economical advantages of this method to be so great, that the fuel question retires into the background. It vanishes altogether if the steam is raised by the waste heat of the retorts as recommended. You would probably reply, "True, but waste heat can be used for steam-engines as well as steam-jets." Quite true, but you would have still the attendance, wear and tear, and still houses for exhausters and engines; whereas, with the steam jet and waste heat, stoking, attendance, and consumption of fuel would be ended, or nearly so, and only periodical inspection would be required.

The steam, having now done the work of exhausting, has to be removed by condensation. If the jet exhauster is fixed after the scrubber, or after the purifier—that is, if it is used to exhaust scrubbed or purified gas—any sort of condenser may be used for this purpose. On the Continent, where upwards of 150 of these exhausters are at work, they are placed on the gasholder side of the scrubber, the steam condensed anyhow, and the condensed water run to waste. This is a considerable waste of force, and this force can be economized by means of the steam scrubber. To do this, the exhauster is fixed at the



outlet of the condenser, and the steam supplies all the water required for scrubbing. The apparatus is externally similar to the "slow-speed" or "scrubbing" condenser already described.

In a letter to the JOURNAL OF GAS LIGHTING of the 16th of February, this scrubber is described in action, and I do not know that I can do better than repeat what is there written:—"The scrubbing-pipes are charged with stiff pine shavings, in thickness about 22 Birmingham wire gauge, and ½-inch broad. These it had been found, even when subjected to a heavy and continuous shower of ammonia liquor, remained open, in a column 9 feet high and 12 inches diameter, supported only at the bottom. These, or such like shavings, have been preferred as scrubbing material, because of the high degree to which they combine the advantages of large surface and small cost in proportion to surface, extent of angular outline, lightness, and slight resistance to the passage of the gas. With the aid of the valves, we have no difficulty in equalizing the flow of gas through the down-pipes. When the valves are once set to the proper angle, they require very little attention. The difference in pressure between the outlet and inlet of the scrubber, when doing its full work, is inappreciable, being under one-tenth of an inch; and, in consequence of the constant cleansing power of the mixed steam and gas, this difference does not increase. These scrubbers will work for an indefinite length of time without requiring to be opened.

"The results obtained are, effectual purification from ammonia, and the complete arrest of tar, oil, and water before the gas reaches the oxide of iron or lime purifiers, so that these remain quite dry. The effect on the illuminating power was fully established, four years ago, by a series of comparative photometric experiments, extending over nine months, and showing the average of the 'steam gas' to be distinctly superior. More recent experience has not unsettled that conclusion.

"The active means by which these results are obtained from the scrubber cost nothing. There is no expenditure for steam or water, as the steam that has passed through the exhauster, and done its work there, supplies the sole fluid provided for scrubbing, and the resistance in the scrubbers is practically nothing. There are no pumps, distributors, engines, or other moving parts whatever, all the work being done by the condensing or condensed steam, in its slow descent through the column. In short, while the apparatus is considerably less in first cost than other forms of scrubbers, with their buildings, engines, pumps, cisterns, and other appliances, the working expenses are *nil*."

The liquor delivered by the steam scrubber varies from 6° to 8° Twaddel, or from 12 to 16 ounces. Manifestly, the strength depends on the proportion of ammonia taken out by the gas condenser. The gas, as it leaves the scrubber, is not absolutely free from ammonia, nor can it be so, as it has just passed through scrubbing material saturated with ammonia liquor; but the trace of ammonia left in it is so small a per centage as to be immaterial. It entirely disappears in the first oxide of iron purifier, and is sometimes absent at the inlet of that purifier. Where lime is used, and where, as in some of the London works, the presence of *any* trace of ammonia is objectionable, it can be removed by a very small quantity of sulphate of iron.

A few words in regard to the working expenses of steam-jet exhausting and scrubbing, as compared with other methods. As gas-works offer a great variety of conditions affecting the calculation, a rough approximation to an average is all I shall attempt. In a work producing say 100,000 cubic feet per hour, or 2,400,000 per day, representing say 240 tons of coal and cannel, we require to pay the wages of a stoker by day and by night, with the addition of about 50 per cent. for cleaning boilers, packing glands, and other incidental work, which I estimate to be 15s. 3d. per day, or ·76d. per ton; I allow half a man's time for attendance to the scrubbing and condensing, and other contingencies in the condensing and scrubbing departments, ·13d.; making a total of ·89d. per ton. I estimate the working expenses of the prevailing methods of exhausting and scrubbing, in a work of this size, in wages spent for stoking, attendance, cleaning, and ordinary repairs, per ton of cannel, to be 2·50d.; difference, 1·61.

For fuel, let us allow a liberal margin. In some trials of consumption of fuel by exhauster engines reported in *Engineering* of the 21st of May, already quoted, I find the least economical of the engines described by the writer "as an engine of a very uneconomical type, non-condensing, and not steam jacketed, steam only supplied at a pressure of about 36 lbs., and cut off by a single slide at about five-eighths of the stroke." This engine consumed at the rate of 96 lbs. of coal per 1000 cubic feet of gas passed, or per ton of cannel (at 10,000 cubic feet per ton) 9·6 lbs. Supposing this coal to cost £1 per ton, we have 1·03d. per ton for fuel.

It has been ascertained by Messrs. Körting Brothers, from special trials made in Germany, that this jet-exhauster requires 5 lbs. of water per 1000 cubic feet of gas passed per hour. I find that the engine described consumed 13 lbs. of water per 1000 cubic feet of gas passed per hour. Of course the consumption of fuel ought to be in proportion to the consumption of water, other things being the same. The quantity of fuel required will vary both with the jet and engine, according to the resistance of the gas and its speed. But we will assume, if you choose, that the jet consumes as much as this, the least economical of those engines. Then we get ·89 + 1·03d. = 1·92 for the jet, and 2·50 + 1·03 = 3·53d. for the prevailing methods; difference, 1·61. To this we must add fuel for scrubber pumps, say ·14 = 1·75 in wages and fuel. Then I estimate the interest and depreciation of the extra value of buildings, engines, and other apparatus now used (excepting boilers), added to the interest on the value of the extra land occupied at present, to amount to about 1·2d. But let us say 1·0d. per ton, which, added to the saving in working expenses, gives a total saving of 2·75d. per ton. Roughly approximating, therefore, it seems we may calculate on saving about 2¾d. per ton by the adoption of this method of exhausting and scrubbing.

But I have heard that the best engines and exhausting machines will pass gas against ordinary pressures with a consumption of about 3 lbs. of water per 1000 cubic feet per hour. Supposing this to be correct, it would reduce the charge for fuel by about ¾d. per ton of cannel. This would still leave an advantage of 2d. per ton, besides getting quit of all the anxiety and superintendence which is due to the use of machinery.

We now approach what may be called literally our *pièce de résistance par excellence*, the citadel of obstruction—viz., the lime purifiers.

For what I have to say on this subject, I am indirectly indebted to our secretary, strange as this may seem to himself. For up to the time when he asked me to read a "paper" at this meeting, and so set me thinking more closely than I had done about the economy of force in general, I did not see my way to any considerable improvement in the purifiers. Now I think I am able to point out a way.

Manifestly it will not do to multiply sets of purifiers, and get over the difficulty as we have done by multiplying passages for the gas through the condensers and scrubbers. But suppose we can open numerous passages through the purifying material itself, at a trifling cost and without imparing its efficiency.

Take lime, for instance (as this sample), prepared in the usual way for purification. Take notice that although uniform, probably, in chemical composition and purifying power, it is not at all uniform in physical aspect. Part of it is in the form of little lumps or nodules, composed of fine hydrate of lime aggregated by mechanical union with water. These are mixed with the looser particles in various degrees of aggregation or in fine powder. The nodules and the powder seem to be equally active in purification. But it is to this loose portion that the resistance to the passage of the gas is chiefly due. If we separate the little lumps or nodules, and carefully charge a purifier with them alone, we shall have in that purifier, between the nodules, numerous passages or spaces in the material, what were formerly occupied by the loose powder, but are now free for the passage of the gas, and we shall by this simple expedient practically remove the resistance of the charge. I therefore propose that we take the moist hydrate of lime as usually prepared, separate the nodules of the size we want by a suitable screen or bolting machine, return the loose material to the unscreened mass, with the addition of water if necessary, and screen again, so bringing all the lime into the nodular condition. These nodules may be used just in the usual way, but it will be found that they can be used advantageously in purifiers of much smaller area, or in deeper layers, consequently with fewer grids, or you may take your advantage in the shape of reduced steam power.

The fact of a great reduction of resistance is one which any one can prove for himself, by the simplest experiment on a small scale.

As to the effect of this treatment on the purifying power of the material, my experiments are still in progress, so that I cannot give you exact figures, but must content myself with saying that I can see no reason why the purifying power should be seriously impaired, if the material is carefully treated. Neither can I yet speak positively as to expense, but on this point I have little fear.

You will easily see how the resistance *must* be small when the gas is first turned into a purifier charged with nodules, but some may think there will be a heavy increase as the charge becomes spent. I have not hitherto found it so, nor do I expect to find it so, although it would perhaps be unsafe to expect *no* increase. Consider that the impurities taken from the gas do not separate themselves from these nodules, so as to occupy and greatly obstruct the passages, but combine chemically and lodge in the pores of the nodules, thus adding to their weight and individual compactness, but still leaving a comparatively free passage for the gas.

I shall only at present give details of one simple experiment made to test my opinion, both as to reduced resistance and purifying power.

A small set of experiment purifiers, each with an area of 120 square inches was charged with 20 lbs. of lime, slacked and prepared in the usual way, and gas passed through them at the rate of about 30 feet per hour, until a trace of sulphuretted hydrogen was found at the outlet. The difference of pressure between inlet and outlet, at the beginning of the experiment, was 2½ tenths, which gradually increased to 10 tenths before the end of the trial.

The same purifiers were charged with the same weight of lime in nodules, prepared as for the former trial. Gas was passed through, at the same rate as before, for 15 hours, when it appeared tainted at the outlet. When discharged, the lime in the foul purifier had all the appearance of being thoroughly spent. The nodules, when crushed, were of a uniform colour. The pressure in this trial, all other things being the same, never rose above 1-10th of an inch.

(To be continued.)

ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS.

The Annual Meeting of this Association was held in the Town-Hall, Manchester, on the 1st inst. After the transaction of some routine business, Mr. W. G. Lynde, of Manchester, was elected president for the ensuing year, and Messrs. Lemon, Deacon, and Pritchett, vice-presidents.

The PRESIDENT, in his inaugural address, spoke of the necessary qualifications of the members for the important posts they had to fill. He said: that the works which they were called upon to perform, to design and execute, brought into play all the powers of the civil and mechanical engineer, and he could confidently state that no person was qualified to undertake the office of surveyor to a municipal or sanitary authority who had not had the education of an engineer. Some of the members appeared to think that the duties of the surveyor also included many of those which strictly belonged to the medical officer of health, and there was no use in disguising the fact that a considerable amount of jealousy existed in many places between those officers. There could be no doubt that in order to arrive at the most satisfactory results there should be perfect unity of purpose and action between the two, and the best way to arrive at this would be to have a clear understanding as to the duties of each department. In his opinion the

medical officer of health should confine himself to defining the principles which he considered the best calculated for dealing with all matters relating to the public health, and when the carrying out of those principles did not involve engineering or structural works, his recommendations should be carried out entirely under his own direction; but where structural works were required, their object should be clearly defined by the medical officer, and the works should then be designed and executed by the engineer or surveyor. With regard to the much-vexed question of Government protection, he was strongly in favour of local self-government, and the surveyor, being the officer of the local authority, should, in his opinion, endeavour to work cordially with its members rather than seek to be under the influence and protection of any central authority, to be used perhaps as a means of coercing the local authority. With regard to the personal question which had been so strongly urged as a reason for Government protection, he was sure, if a surveyor discharged his duty courteously and firmly, he need be no respecter of persons, as he would always be sure of the public support if any undue influence were attempted to be brought to bear upon him.

It was resolved that the next meeting should be held in London.

Mr. ANGELL (ex-president) proposed a vote of thanks to the president, for his address, and said he only differed with him on one point, and that was on the subject of protection. No one had greater respect for local self-government than he had, but any one of experience knew the littleness by which local government was sometimes governed. In the smaller towns it was something utterly impossible for a man to maintain his position in freedom and independence, and at the same time to serve his local governing body.

Mr. LEMON, who seconded the resolution, said he did not want protection himself, but he knew many of his brother surveyors who felt the want of it seriously.

The resolution was carried unanimously.

At the afternoon meeting several papers bearing on the question of the disposal of town sewage were read. Mr. Leigh, the officer of health for Manchester, described the system in Manchester for the disposal of sewage; Mr. Fowler, the borough engineer of Salford, explained the self-acting water-closet of his own construction, which had been adopted by the corporation in Salford; Mr. Goodall explained the principle of the system adopted at Leeds; and Mr. Elcock, of Manchester, read a paper on the profitable utilization of towns refuse. Major-General Scott read a paper on "The Modern Interception System and Manchester Sewage."

The proceedings were resumed on the 2nd inst., when a paper was read by Mr. A. Jacob, of Barrow, on "Stone Breaking by Machinery." Mr. W. H. Bailey, of Salford, read a paper on the "Prevention of Kitchen or Bath Boiler Explosions, and the Bursting of Water-Supply Pipes in Winter" (which paper, with some others, we shall publish at length so soon as the demands on our space will permit). Mr. E. B. Ellice Clark, of Ramsgate, read a paper on the "Increased Rate of Mortality in the Towns of England." Mr. Vawser, of Warrington, on "Artisans and Labourers Dwellings:" Mr. Skelton, of London, on "Street Lighting;" and Mr. Fowler, on the "Main Drainage of the Borough of Salford." The proceedings closed on the 3rd inst. with a visit to the water-works at Woodhead.

MONTE VIDEO GAS COMPANY, LIMITED.

The Third Ordinary General Meeting of the Shareholders of this Company was held at the City Terminus Hotel, on Wednesday last—J. BRAMLEY-MOORE, Esq., in the chair.

The SECRETARY (Mr. J. T. Denniston) having read the minutes of the last meeting, the following report and accounts were presented:—

The directors submit to the shareholders the accompanying statement of accounts for the year ending Dec. 31, 1874.

The net profit on the year's working amounts to £40,790 1s. 4d., including £317 10s. 3d., brought forward from the year 1873. Out of this the directors paid, in November last, a dividend of 4 per cent. for the first half of the year, which absorbed £20,000. The accounts thus show a sufficient amount to cover a second dividend of 4 per cent. on the original shares of the company, making 8 per cent. for the year, free of income-tax, and interest at the same rate for three months on the new shares.

The directors regret, however, that in consequence of the crisis at Monte Video, with which the shareholders are fully acquainted, remittances have been delayed, and it is proposed, with the sanction of the shareholders, to defer the declaration of the dividend until the company is in funds, when a *pro formâ* meeting will be called for that purpose.

The directors report that the bills held on Messrs. Mauá and Co. amount to £5717 14s. 1d., on which no loss is anticipated, as the company holds securities of His Excellency the Viscount for a much larger amount.

In accordance with the 29th article of the association, the viscount vacates his seat at the board, which is a source of profound regret to the directors, and they express a hope that this resignation will only be temporary, and that the shareholders will soon again have the benefit of his valuable services.

The dock revenue is satisfactory and promises to realize the expectations held out to the shareholders.

In conclusion, the directors congratulate the shareholders on the satisfactory position of the company, and on its future prospects, which are encouraging.

The directors who retire by rotation are, Mr. Richard Carruthers, and His Excellency the Viscount Nioac, who, being eligible, offer themselves for re-election.

The auditors, Mr. John Cater and Mr. Edwin Waterhouse, of the firm of Messrs. Price, Waterhouse, and Co., retire, and offer themselves for re-election.

Dr. *Balance-Sheet, Dec.* 31, 1874. *Cr.*

Capital, 25,000 shares of £20 each, fully paid		£500,000	0	0	Capital expenditure—	
2086 new shares of £20 each, fully paid		41,920	0	0	Cost of gas-works, mains, concession, dock, plant, and sundries, as per balance-sheet, Dec. 31, 1873	£493,991 3 10
Sundry creditors, London and Monte Video		2,438	5	4	Add expenditure in extension of mains, enlargement of the retort-houses, purifiers, &c., during the year ending this date	3,452 11 1
Reserve-fund		9,750	0	0	Buoys for dock entrance channel	435 10 8
Dividends unclaimed		45	12	0	Iron coal lighter	1,308 12 10
Profit and loss account—					Expenditure on new station and gasholder	7,302 15 11
Balance brought from last year	£317 10 3				Stock of coals at cost	16,697 15 5
Net profit for the present year	40,472 11 1				Ditto residuary products	482 11 1
	£40,790 1 4				Ditto gas-fittings and meters	14,465 14 2
Deduct *ad interim* dividend	20,000 0 0				Furniture in London and Monte Video	623 11 11
Balance available for further dividend		20,790	1	4	Sundry debtors, being gas consumers in Monte Video	15,547 9 2
					Coals and other goods for shipment and afloat	9,460 0 2
					Bills receivable in transit	9,512 18 8
					Cash in London	573 5 4
					Ditto in Monte Video	1,089 18 5
		£574,943	18	8		£574,943 18 8

Profit and Loss Account for the Year 1874.

Cost of manufacture and expenses in Monte Video	£71,037	3	6	Sale of gas, residuary products, rent of meters, and sale of gas-fittings	£108,074	8 4
Directors fees, salaries, and London office expenses	2,284	10	8	Dock revenue	6,176	18 11
Interests on loans and discounts	903	18	3	Iron lighter	262	15 0
Income-tax	624	17	3	Gains on exchange	331	17 3
Balance, being profit for the year	40,472	11	1	Interest received	66	16 8
				Commission on freights	382	19 7
				Transfer fees	27	5 0
	£115,323	0	9		£115,323	0 9

The CHAIRMAN said that the accounts pretty well explained themselves, but still a remark or two from him would not be out of place. The first thing to which he would direct their attention was the very satisfactory dividend which he hoped they would receive, as recommended in the report. It had been really earned, and something more, taking into account the dividend on the new capital which had been wholly unproductive. In the report the stock of coal, gas-fittings, and meters, &c., was stated to be more than £30,000 in value, and that was really an asset of the company. There was due to the company from consumers of gas in Monte Video over £15,000, which was a good asset, but Monte Video being in a state of revolution, and the commercial and private interests of the place being totally disarranged, it was difficult to realize the debts due to the company so rapidly as hitherto. Besides all this, their manager had been obliged to leave the place, owing to the political crisis, and this would account for the delay in the accounts coming to hand. As regarded the working of the company, he hoped they would consider it satisfactory. They had supplied 236 new houses and 70 new lamps since 1873, and the increase in the consumption of gas in 1874 over 1873 amounted in the private part of the community to 9 million cubic feet, and in the public part to 4 millions, or nearly 17 per cent. increase upon the whole consumption. He might also mention that the dock, which was not yet complete, had produced a revenue of £6176. Some alarm had been created by the Government issuing a paper currency, but they had the assurance that they were to receive gold for their gas sales, or the equivalent in the paper currency. He (the chairman) moved the adoption of the report and accounts.

Mr. YOULE seconded the motion.

Mr. LOWE said that he regarded the report as anything but satisfactory; the profits had increased about 20, and the expenses about 42 per cent., as compared with former years. The reserve-fund stood as it did last year, and the profit was only £40,000. The stock of coal last year was £29,000; this year it was £31,000. He objected to their officers mixing themselves up with political matters, and considered it monstrous that, while other foreign gas companies with which he was connected could get their accounts out in April, they were kept by the officers of this company till the end of June. To ask them to pass the accounts without receiving their dividend was like asking for a receipt without paying the money. He concluded by proposing an amendment, to the effect that the report and accounts be not passed.

A SHAREHOLDER said that although he was not about to second the amendment of the previous speaker, he certainly looked upon the accounts as very unsatisfactory, having regard to the increased cost of working. He also thought that great laxity must have prevailed in allowing the manager to connect himself with any political party. He would like to know who were the committee of management in Monte Video.

The SECRETARY said that three gentlemen—two natives and one Englishman—managed the business.

In reply to various questions,

The CHAIRMAN said, with regard to non-payment of the dividend, there were £15,000 owing to the company from its customers in Monte Video, which might arrive in a week or ten days, and, so far as they knew, the whole of that would be paid, as the directors had telegraphed ordering the amount to be collected at once. They were now buying coal very much cheaper than they did in 1873. With regard to the staff, the company took them with the concern, and the directors were making every effort to fill the various parts with Englishmen. They had lately sent out a first-rate man to manage the gas department, and under him everything seemed to be going on as it should do. The directors really had nothing to conceal, and the accounts and everything connected with the company might be seen by any shareholder who would come to the office. He would ask the solicitor to answer the question as to the security held by the company.

Mr. CLEMENTS (the company's solicitor) said the security held for the completion of the dock, and to cover Baron Mauá's bills, was 1000 shares in the company, which at par would be worth £20,000, and they had a lien on them to the extent of £14,000. He entreated the shareholders not to refuse to pass the accounts, as there really was no cause for alarm, and if they waited a short time everything would come right, and they would receive their dividend. He could not say when the dock would be finished, for so much of the work was carried on in the dark, blasting, &c., that it was impossible to say with any certainty how much longer it would take to complete it, but he knew that the directors were most anxious it should be finished, though even in its present state it earned over £4000 net profit, besides cheapening the coal used by the company.

Mr. LOWE having consented to withdraw his amendment, the report and accounts were passed.

The CHAIRMAN then moved that His Excellency Viscount Nioac and Richard Carruthers be re-elected directors of the company.

Mr. LOWE thought that a gentleman living in Paris was hardly the right man for a director. Mr. Carruthers, too, was, he understood, 80 years old, and he thought they wanted a more vigorous person on their board. In their place the following gentlemen were suggested as being suitable for the post—viz., Mr. Bartlett James or Mr. A. K. Mackmann, or failing these, perhaps Mr. Lewis Howard.

Mr. W. WOODSWORTH moved that a vote of thanks be passed to Mr. Carruthers for his past services, and the great interest he had manifested in the company's prosperity, which was briefly seconded by Mr. Bransby Moore, and cordially passed.

The auditors, Mr. John Cater and Mr. Edwin Waterhouse, were re-elected for the ensuing year, at a remuneration of 20 guineas each.

After some discussion, Mr. CLEMENTS expressing an opinion that the meeting could not then elect new directors without previously proposing them, it was agreed formally to adjourn the meeting till Friday, the 23rd inst., and then elect two gentlemen to fill the vacancies on the board.

The customary vote of thanks to the chairman terminated the proceedings.

MALTA AND MEDITERRANEAN GAS COMPANY, LIMITED.

The Annual Ordinary General Meeting of this Company was held at the Offices, 60, Gracechurch Street, on Tuesday, the 29th ult.—Mr. J. B. PADDON in the chair.

After the usual preliminaries, the following report and accounts were taken as read:—

The directors have to present their report and the balance-sheet of the company for the year ending the 31st of March last.

It will be observed the balance of profit and loss account shows an improvement over the previous year of £1442 8s. 2d.

The directors recommend declaration of the following dividends for the year: On the first preference shares, 7 per cent.; on the second preference shares; 7½ per cent.; and on the ordinary shares (free of income-tax), 2 per cent.; leaving a balance of £261 4s. 3d. to be carried to the next account.

The receipts for gas are not quite equal to those of last year, the extreme cheapness of petroleum at all the stations, added to the dulness of trade at Malta, through the absence of the fleet, and the delay in rebuilding the opera house, having unfavourably affected the consumption.

The price of gas at Malta and Corfu, which, in consequence of the great increase in the cost of coal, the directors most reluctantly raised 1s. 6d. per 1000 cubic feet, has already been reduced by 1s., and on the 1st of July next the old charges will be resumed, although the present price of coal is still in excess of the original rates.

The amount of capital expended during the year is inconsiderable.

The directors are willing to make a further issue, to a moderate extent, of the second preference shares (7½ per cent.), not for the purpose of additional expenditure, but with the object of reducing the present amount of the company's debentures.

With deep regret the directors have to announce the death of their chairman and valued colleague, Lord Alfred Hervey. Major W. S. Suart, R.E., has been elected a director in his place. As on this occasion Lord Alfred Hervey would have retired, Major Suart retires, but offers himself for re-election.

The auditors, Henry M'Lauchlan Backler, Esq., and James Le Geyt Daniell, Esq., also retire, and likewise offer themselves for re-election.

Dr. *General Balance-Sheet, March 31, 1875.* *Cr.*

Capital—				Preliminary expenses and sundry accounts (balance)	£386	0	4
£5 per share on 15,000 ordinary shares	£75,000	0	0	Outlay at the stations	133,840	14	7
Less discount on shares authorized, 1868	3,000	0	0	Suspense accounts	283	11	9
	£72,000	0	0	Commission on debentures (balance)	167	17	10
£5 per share on 6000 1st preference shares (7 per cent.)	30,000	0	0	Furniture, London office	94	15	1
£5 per share on 1189 2nd preference shares (7½ per cent.)	5,945	0	0	Goods in transit	683	1	2
£1 per share on 1408 ditto	1,408	0	0	Sundry debtors	7,414	15	11
Loans on debentures	44,365	0	0	Bills receivable	1,320	0	0
Sundry creditors	1,268	9	7	Stocks	12,725	19	0
Reserve-fund	1,124	12	11	Cash	2,289	4	2
General revenue	3,094	17	4				
	£159,205	19	10		£159,205	19	10

Profit and Loss, for Twelve Months ending March 31, 1875.

Coal	£8,948	14	5	Gas	£19,854	15	1
Gas-making (salaries and wages)	2,321	10	1	Coke	2,889	5	10
Charges on street lights	1,037	7	11	Tar	91	11	2
Wear and tear	1,156	5	3	Meters and fittings	578	0	0
Lime and purifying	162	2	0	Stock	13	9	1
Rents	38	7	2	Transfer fees	2	15	0
Stoves	20	16	11				
General expenses	696	3	8				
Bad debts and allowances	90	17	6				
Income-tax, paid in Sicily	11	2	3				
Audit fee, Malta	21	0	0				
Treasurer's commission at stations	276	12	0				
Loss on fittings	62	19	6				
Preliminary expenses and sundry accounts	386	0	3				
London expenses	1,021	17	9				
Law expenses	101	13	6				
Commission on shares	31	15	0				
Exchange	235	14	8				
Interest on debentures	3,033	6	5				
Interest and discount	11	8	7				
Income-tax	19	12	7				
General revenue account	3,704	10	9				
	£23,409	16	2		£23,409	16	2

General Revenue Account.

Dividends on preference shares paid on account in Dec., 1874—				Balance from last account, after payment of dividends	£694	10	11
1st preference shares (7 per cent.)	£1,050	0	0	Profit and loss	3,704	10	9
2nd ditto ditto (7½ per cent.)	254	4	4				
Balance	3,994	17	4				
	£4,399	1	8		£4,399	1	8

The CHAIRMAN addressed the proprietors, and having alluded to the loss the company had sustained by the decease of its late chairman, Lord Alfred Hervey, he remarked on the salient features of the balance-sheet, and congratulated the proprietors on the improved condition of their affairs. He then moved the adoption of the report and accounts.

Mr. STEPHENSON seconded the motion, joining in the expression of regret at the decease of Lord Alfred Hervey, and speaking highly of the qualifications of the new chairman.

The motion having been carried, and Major Suart re-elected a director, and Mr. Backler and Mr. Daniell auditors, Mr. STOKES moved a vote of thanks to the chairman and directors, which was carried unanimously.

Mr. WHIFFEN moved the thanks of the meeting to the secretary, and the motion was also carried.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

There is very little change in the condition of trade, almost all branches of business being fully as quiet as they have been any time these three months.

It remains to be seen whether the drop in the price of finished iron declared at the Wolverhampton and Birmingham quarterly meetings will be followed by a reduction in this district. The step may possibly be taken, but no intimation of any such intention has at present been given, and it is, therefore, wholly premature to surmise what may be done.

It is even likely that the cost of production which has for some time past been nearly equal to the selling prices of the finished article, cannot be so reduced here as to admit of any lowering of quotations, in which eventuality either the cost of fuel must come down or wages again suffer. Pig iron is easy, and is not in very strong demand locally, a good many smelting firms in the vicinity having large stocks of cinder and other common pigs on hand. Middlesbrough agents figures are currently approximate to the following:—Cleveland G.M.B., No. 1 foundry, 57s.; No. 2 foundry, 54s.; No. 3 foundry, 51s. 6d.; No. 4 foundry, 50s.; No. 4 forge, grey, 49s.; No. 5 forge, mottled, 48s. 6d.; No. 6 forge, white, 48s.; refined metal, 69s.; Kentledge, 57s.; and cinder pigs, 41s. to 42s. per ton, all for net cash. Hematite pig irons, used for the production of Bessemer steel, which is now so largely supplanting common cast steels, are now a few shillings easier, and range from 87s. 6d. to 90s. per ton at the works. Most of the iron foundries are becoming much slacker, the new orders being far from replacing those just worked through, either in number or as to size. Many of the new collieries have progressed near to actual completion, so far as the fixing of castings is concerned, and it is needless to observe that there is now very little fresh enterprise either in the way of beginning colliery operations or of erecting new iron-works.

Messrs. Parker's new foundry at Barnsley has just been started.

Fuel is still being sold at any price that can be obtained, the market for almost all qualities being excessively dull.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

Circulars were issued on Thursday last by Mr. E. Fisher Smith (the Earl of Dudley's principal agent), and with one exception by all the leading makers of branded iron, announcing a reduction of £1 per ton on all descriptions of merchant iron; prices are therefore now on the standard of £10 per ton for branded bars. The New British Iron Company as yet have made no change in their quotations, but it is obvious that they will soon be compelled to adopt the resolution of the other members of the trade. Sheet makers, too, with the exception of the makers of the most noted brands, such as "Wilden" and others, have taken independent action in the matter, and have intimated their intention of still adhering to the old rates, common sheets (singles) being still quoted £11 5s. to £12 per ton. The sheet trade, it is stated, is still comparatively brisk, which will account for the exceptional firmness of quotations in this department of the trade. Quotations for the commoner qualities of finished iron are nominally unchanged, makers declaring that their prices have already been discounted to the full extent of the reduction just declared by the leading firms, but practically prices are weaker, and makers appear anxious to secure specifications on any reasonable terms. In most departments of the trade great slackness prevails, and but few of the mills and forges are making full time. It does not yet appear that the recent concession in prices has led to any great improvement in the demand.

In pig iron the market continues much depressed by the large importation of cheap pigs from other centres of production, notably the North of England. The leading makers in the South Staffordshire district have decided to reduce the prices of both hot and cold blast to the extent of 10s. per ton. Prices will, therefore, be for hot blast £4 10s. to £4 15s., cold blast £5 15s. to £6 per ton. Cinder pig is now offered at £3.

The coal trade is without important change, the demand is still languid, and in the Wolverhampton district prices for the commoner qualities of fuel are again weaker, colliery agents are actively engaged in soliciting orders, but few contracts are being entered into at present.

The wrought tube and fitting trades of Wednesbury are still in a very unpromising condition, and it is feared that the industry will be permanently injured by the crisis through which it is now passing.

THE COAL AND IRON TRADES OF LANCASHIRE.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of this district continues exceedingly quiet, and the recent reductions in prices do not seem to have had any material effect in improving the position of the market. There is still a good deal of competition for orders, and prices are very unsteady. This is especially the case in the Wigan and neighbouring districts; any orders that are in the market are keenly competed for, and excessively low prices are accepted. Some classes of common coal, which the holders are compelled to push upon the market, are being sold at prices that do not cover the cost of production; and it is only in the better qualities of coal that there is any fair margin for profit. The average pit prices are about as under:—Slack, 3s. 9d. to 4s. 9d.; burgy, 6s. to 7s.; common coal, 8s. to 9s.; Pemberton four-feet, 10s. 6d. to 11s.; and Arley Mine coal, about 13s. per ton.

The shipping trade is still very dull, and good Lancashire steam fuel, delivered alongside at Liverpool, does not realize more than from 10s. to 11s. per ton. There is only a small inquiry for the coasting trade, and, as many of the foreign markets are now overstocked, it will be some time before there is any generally active demand from abroad.

There is only a very quiet business doing in the gas coal trade at present. Although there are a fair number of inquiries, they are mostly at low prices, ranging from 9s. to 11s. per ton for screened coal at the pit's mouth.

There is a very unsettled feeling in the Oldham district with regard to the wages question. At some of the pits notices for a reduction of 15 per cent. have already expired, but the matter is being held over until the men have had an opportunity of consulting personally with the union officials as to what course they shall take.

There is still no sign of practical improvement in the iron trade, and the reduction of prices at the quarterly meeting has had no material effect in bringing forward business. No. 3 Middlesbrough foundry iron is now being offered for delivery in this district at 59s. 3d.; No. 4, at 58s. 6d.; and No. 4 forge at 57s. 6d. per ton, and even less prices are being taken in exceptional cases to secure orders. Lancashire pig iron, so far as the leading makers are concerned, is without change, but some of the small firms have been accepting less money to effect sales. For finished iron there has not been much demand, but it is expected that the lower prices resolved upon at the quarterly meetings may bring forward some business before long. Several makers, however, had generally, to a considerable extent, already discounted the reduction, and ordinary bars delivered are quoted at £8 7s. 6d. per ton. Other descriptions of iron are the same as last quoted.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the North of England continues in a somewhat dull state. There is no special inquiry for any sort, and second-class gas coals are not much inquired after in the market. There is no change in official quotations, but, as indicated on several occasions during this summer in these columns, many collieries, especially those that have not an established position in the trade, make the best bargain they can when business is offered them at a price. Coal turns at the shipping places are, as a rule, not more than 30 hours, which is a fair index of the state of business here. The pitmen are working pretty steadily, but the employment in hand will hardly yield a full average of 11 days a fortnight. Manufacturing coals have not been inquired after very much recently, and they are easier in the market.

There was a little more inquiry from the east coast and Channel ports last week. A few more orders were to hand, and there has been a trifling advance upon freights in some instances. Business to London, however, is without much change, and as low as 4s. 6d. per ton was paid last week to steamers to load coals for the Pool. There was no much inquiry for vessels to load coals for the lower ports of the Baltic, and business to Cronstradt was quiet. There was a slight improvement in trade to the Mediterranean, and an advance of 5s. a keel was established. A few more gas and steam coals were shipped to that sea; but taking the coal trade in the North of England as a whole, the amount of business transacted the week after the holidays was below an average for the time of year.

The iron trade of the Cleveland district is depressed, and manufacturers and commercial people there admit that the prospects are not good. Prices are unaltered, but little or no business is doing. Of the 157 blast furnaces in the Ironmasters Association, 120 only are in operation. The chemical trade of the Tyne dragged a little last week also, and the shipments were small. In fact, the general manufacturing trade of the North continues in a somewhat lifeless state, and the prospects of any great revival of business seem to be somewhat remote.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

Never, "within the memory of the oldest inhabitant," has there been such a rush of announcements regarding gas affairs as within the last few weeks; and in this week's "Notes" I might easily take up far more than my allotted space with them, even though I were to give them in a very condensed form. Let me first make an addition to what I stated regarding Auchtermuchty last week. Besides reducing the price of gas from 7s. 11d. to 7s. 1d. per 1000 cubic feet, and declaring a dividend of 9 per cent., it was resolved to take 25 per cent. off the meter-rate.

At the annual meeting of the Auchterarder Gaslight Company, held a few days ago, a dividend of 7½ per cent. was declared, and the price of gas to consumers was reduced from 9s. 7d. to 8s. 9d. per 1000 feet.

The annual meeting of the Alyth Gas Company was held last Monday, when a very favourable report from the directors was submitted. Their recommendations were, a dividend of 5 per cent., and a reduction in price from 9s. 2d. to 8s. 4d. per 1000 feet. A motion, made by the chairman, to the effect that the reduction be 1s. 8d. per 1000 feet, was lost. A motion to make the divi-

dend 7½ per cent. was rejected, as was also one to give the consumers 5 per cent. discount if they paid their accounts within one month after each inspection of the meters. The shareholders at the Kirriemuir annual meeting were more docile. They unanimously adopted the financial report presented to them, as also the directors recommendations. The latter were, a reduction of 10d. per 1000 feet, which brings the price down to 8s. 4d., and a dividend to the shareholders, to be the same as last year—namely, 6 per cent. and a bonus of 2 per cent.

There was also some division among the directors and shareholders of the Coupar-Angus Gas Company. By the casting vote of the chairman, the directors recommended a reduction in price from 10s. 5d. to 9s. 2d. per 1000 feet, the minority being in favour of only 10d. for a reduction. Neither shareholders nor ratepayers were satisfied even with the reduction of 1s. 3d., and at the annual meeting, held on Wednesday, a petition from a number of the ratepayers was submitted, which asked for a larger reduction, and a motion to reduce the price to 8s. 4d. was made, but it was not even seconded. It seems, however, that the outside public will not be content until the price is reduced to 7s. 6d. per 1000 feet. The dividend declared was 7½ per cent.

Still confining myself to the same part of Scotland, I must next pass Arbroath under notice. A meeting of the Town Council, as the Gas Corporation, was held yesterday, when the balance-sheet for the year was read. The revenue from gas and meters was £8703 18s. 4d., and there was a deficiency of £582 10s. 9d. The provost, who presided, said that while he did not look for profit this year, until lately he did not expect that there would be any loss. He was disappointed with the result. Mr. Dickson and others expressed themselves similarly. It was agreed to remit to the committee to employ a person of skill to examine the meters, to see if the deficiency was caused by structural defects or otherwise. In respect that the price of gas is fixed by the Arbroath Gas Act at 5s. 10d., the corporation resolved to meet on a subsequent day to impose an assessment to make good the deficiency.

Next in order there is Crieff, in the adjoining county of Perth. The annual meeting of the gas company of that town was held a few days ago, when the recommendation from the directors that the dividend be 9 per cent. was adopted. It was also agreed to reduce the price of gas 10d. per 1000 feet; that is, to 7s. 6d. During the year just concluded there have been two reductions of 10d. each, or from a maximum of 9s. 2d.

There are now two places in Fifeshire to be mentioned. At Cupar-Fife, where the annual meeting of the gas company was held last Thursday, the price has been reduced from 5s. 10d. to 5s. per 1000 feet for the ensuing year; and the shareholders of the Anstruther and Cellardyke Gas Company have agreed to reduce the price from 8s. 4d. to 7s. 6d. per 1000 feet. They have also declared a dividend of 8 per cent., while a sum of £105 has been voted out of the year's profits for a station-meter, and a balance has been carried forward.

It is now reported that the finances of the Glasgow Corporation Gas Commissioners are in such a favourable state that there is reason to hope for a reduction to 4s. 7d. per 1000 cubic feet, dating from May last, instead of from November next, at which latter date the reduction must, in any case, take place, owing to the powers of the Provisional Order then expiring.

The Bothwell and Uddingstone Gas Company, Limited, held their annual meeting last Tuesday, when a dividend of 7½ per cent. was declared. It was resolved to issue 1500 new shares, so as to make the capital represent the stock, such shares to be offered to present shareholders at par in proportion to their interests in the company, in accordance with the Articles of Association, those shares not taken up to be offered to the public by auction, as formerly. It was stated that from April last the charge had been reduced from 6s. 3d. per 1000 feet to 5s., and as the company provide, gratuitously, lighting for the roads and streets of Bothwell, Uddingstone, and district, which is equal to a rate of 5d. per 1000 feet, the real charge is thus reduced to 4s. 7d., and the directors of the company anticipate a still further reduction.

At Kilwinning, in Ayrshire, where the annual meeting of the gas company was held last Tuesday, the price of gas has been reduced from 6s. 8d. to 6s. 3d. per 1000 feet, and a dividend of 10s. per share has been made. Instructions were given at the meeting to the directors to renew and enlarge the purifiers as soon as practicable. A reduction has been made to 6s. 8d. per 1000 feet at Stranraer, while at Hawick a reduction has been made from 7s. 1d. to 5s. 10d. per 1000 feet, and at Selkirk from 7s. 6d. to 6s. 8d.

My gas news items, referring to Paisley, Ayr, and Kilmarnock, must be held over till next week, as also my "Notes" on water supply.

The price of pig iron was up at 60s. 9d. to 61s. early in the week, and the market was a good deal animated; but flatness set in on Thursday, and on the following day business was done down to 60s. cash, and 59s. 9d. 14 days.

Coal is still exceedingly dull in demand, and prices are even lower than they were a few weeks ago.

SANITARY AND EDUCATIONAL EXHIBITION.—The fourth exhibition of Sanitary Educational, and Domestic Appliances in connexion with the congress of the National Association for the Promotion of Social Science, will take place from the 6th to the 16th of October, in the Corn Exchange, adjoining the Dome of the Pavilion, Brighton. The object of the exhibition, as heretofore, is to bring under the notice of the public generally, and particularly those who are interested in social, sanitary, educational, and economical questions, the latest scientific appliances for improving the public health, promoting education, and advancing social economy. These will be arranged in six classes viz.— 1. Warming, Ventilation, and Lighting. 2. Domestic Appliances and Economic Apparatus. 3. Sanitary Architecture and Appliances. 4. Sanitary Engineering and Methods of Disinfection. 5. Food and Clothing. 6. School Furniture and Educational Apparatus.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

2320.—BOULTON, M. P. W., Oxford, and IMRAY, J., Southampton Buildings, London, "Improvements in helical pumps." June 25, 1875.

2328.—PEEBLES, D. B., Edinburgh, "Improvements in governors or apparatus for regulating or controlling the pressure and flow of illuminating or other gas." June 26, 1875.

2334.—SMYTH, W. W., Maidstone, Kent, and HUNT, G. G., New Cross, London, "Improvements in gas-engines." June 26, 1875.

2345.—MORGAN-BROWN, W., Southampton Buildings, London, "Improvements in pumps." A communication. June 28, 1875.

2346.—WEST, J., Maidstone, Kent, "Improvements in apparatus for discharging gas-retorts." June 28, 1875.

2358.—ODAMS, J., Fenchurch Street, London, and BLACKBURN, R., Exeter, "Improvements in apparatus for treating sewage." June 29, 1875.

2377.—SMITH, F. J., Taunton, Somerset, "Improvements in apparatus for flushing or cleansing urinals, water-closets, sewers, and for other analogous purposes." June 30, 1875.

2381.—BROTHERS, F. W., Cheltenham, Gloucester, and BROTHERS, C., Blackburn, Lancs, "Improvements in apparatus used in the manufacture of gas." June 30, 1875.

2387.—HOLMES, J. M., Birmingham, "Improvements in gas-stoves for cooking and heating." A communication. June 30, 1875.

2401.—BANNER, E. G., Billiter Square, London, "Improvements in house traps for preventing the passage of sewer gas into dwellings from sewers, drains, or cesspools." July 2, 1875.

2406.—LITTLE, W. A., Hammersmith, London, "Improvements in the means and apparatus for producing animal charcoal and other filtering materials for use as purifiers of liquids and gases, and for reviving or restoring the same when exhausted by use." July 3, 1875.

2412.—BROOKES, W., Chancery Lane, London, "Improvements in means or apparatus for the manufacture of illuminating gas from petroleum or other hydrocarbon oil." A communication. July 3, 1875.

GRANTS OF PROVISIONAL PROTECTION.

2063.—DIXON, J., New York, "Improvements in reflectors for gas or other burners and lamps." A communication. June 4, 1875.

2067.—KEY, W., Accrington, Lancs, "Improvements in station gas-governors." June 5, 1875.

2087.—CLELAND, W., Linacre, Lancs, "Improvements in the means and apparatus for the purification of gas manufactured from coal, cannel, shale, and like materials." June 7, 1875.

2095.—MURDOCH, H. H., Staple Inn, London, "Improvements in the joints of pipes or tubes." A communication. June 7, 1875.

2105.—SIMMONS, J., New Cross, London, "Improvements in rotary engines and pumps." June 8, 1875.

2131.—MAXWELL, N. M., Queen Victoria Street, London, "Improvements in the construction of taps or cocks." June 10, 1875.

2177.—BOLTON, F., Weaste, Lancs, "An improved index or registering apparatus for gas and water meters." June 14, 1875.

2184.—PREISWERK, L., Notting Hill, London, "Improvements in propelling vessels, partly applicable for obtaining motive power for raising water, and for exhausting and compressing air and gases for other purposes." June 14, 1875.

2251.—FAGEOL, P., Paris, "An improved gas generator." June 19, 1875.

NOTICES TO PROCEED.

660.—BATES, G., Lewes, Sussex, "Improvements in apparatus for attaching main-cocks, valves, plugs, or other connexions to service-pipes for water when under pressure." Feb. 23, 1875.

668.—NEUHAUS, M., Strand, London, "Improved means and appliances for the production of lighting and heating gas from air and spirituous vapour combined." Feb. 23, 1875.

724.—REYNOLDS, O., M.A., Manchester, "Improvements in apparatus for obtaining motive power from fluids, and also for raising or forcing fluids." Feb. 27, 1875.

770.—CLARK, A. M., Chancery Lane, London, "Improvements in gas-meters." A communication. March 2, 1875.

793.—JUSTICE, P. S., Southampton Buildings, London, "Improvements in valves." A communication. March 3, 1875.

820.—WISE, W. L., Adelphi, London, "An improved continuous horizontal apparatus for washing or absorbing gas or vapours, or for distilling liquids." A communication. March 5, 1875.

833.—FARNSWORTH, S., Nottingham, "Improvements in valve apparatus for controlling the passage of water or other fluids." March 6, 1875.

1440.—NEWTON, W. E., Chancery Lane, London, "Improvements in the construction of water-meters." A communication. April 20, 1875.

1515.—LAWRENCE, J. E., and PORTER, E. V., Westminster, London, "Improvements in combined engines and centrifugal pumps." April 24, 1875.

1994.—BROOKES, W., Chancery Lane, London, "Improvements in means or apparatus for conducting and controlling the flow or passage of water, gas, or other fluids, or vapours." A communication. June 1, 1875.

2105.—SIMMONS, J., New Cross, London, "Improvements in rotary engines and pumps." June 8, 1875.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

4490.—ANDERSON, W., Southwark, London, "Improvements in centrifugal pumps." Dec. 31, 1874.

50.—DEACON, G. F., Liverpool, "Improvements in apparatus for measuring the flow of water in pipes." Jan. 5, 1875.

66.—KIDD, J., Martin's Lane, London, "Improvements in the manufacture of gas for lighting and heating purposes, and in the apparatus connected therewith." Partly a communication. Jan. 7, 1875.

91.—MACKAY, G., Edinburgh, "Improvements in purifying liquids, in obtaining or preparing the purifying agents, in recovering, treating, and utilizing matters contained in such liquids, as well as other waste or bye products of manufactures, and in means or apparatus employed therefor." Jan. 11, 1875.

112.—SELLARS, J. C., Birkenhead, "Improvements in cement." Jan. 12, 1875.

184.—WALLER, G., Southwark, London, "Improvements in apparatus used in the manufacture of gas." Jan. 18, 1875.

272.—POTTS, J. C., Stafford, and DARNELL, D. C. W., Edinburgh, "Improvements in apparatus for ventilating water-closets, lavatories, bath-rooms, sinks, and other structures and appliances connected with sewers." Jan. 23, 1875.

417.—CHAMBROY, E. A., Paris, "Improvements in cocks for water, steam, air, or gases." Feb. 4, 1875.

439.—WIRTH, F., Frankfort-on-the-Maine, Germany, "Improvements in valves." A communication. Feb. 5, 1875.

678.—WIRTH, F., Frankfort-on-the-Maine, Germany, "Improvements in stop-valves." A communication. Feb. 24, 1875.

696.—QUICK, J., and RESTLER, J. W., Westminster, London, "Improvements in meters for measuring liquids." Feb. 25, 1875.

744.—DICKSON, J. F., Leicester, "Improvements in air and gas engines or motors." March 1, 1875.

1172.—HOGG, J. B., Edinburgh, "An improved gas torch or fire-lighter." April 1, 1875.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1687.—CAREY, R., "Improvements in rotary pumps, applicable also as fluid meters." June 4, 1872.

1747.—CLARK, A. M., "An improved fastening for the lids or covers of gas-retorts." June 10, 1872.

1752.—HENGST, C. F., and MUSCHAMP, J. B., "Improvements in the manufacture of gas, and in the apparatus employed therein." June 11, 1872.

1898.—ATKINS, T., "Improvements in pumps, parts of which improvements are also applicable to other purposes." June 24, 1872.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

1831.—BROOMAN, C. E., "Improvements in apparatus for the manufacture or production of carbonic oxide, hydrogen, and carbonated hydrogens." June 4, 1868.

1954.—SILLAR, W. C., SILLAR, R. G., WIGNER, G. W., "Improvements in deodorizing and purifying sewage and making manure therefrom." June 15, 1868.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

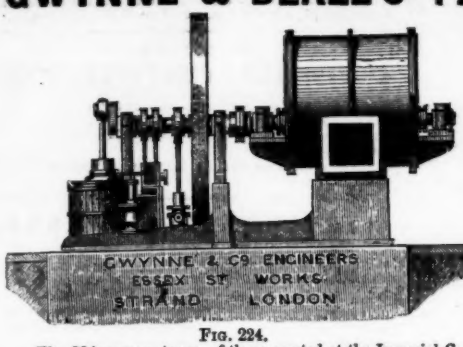


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.
Made under the personal superintendence of
Mr. BEALE,
The oldest Maker, Inventor and Patentee of
GAS-EXHAUSTING MACHINERY.
(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

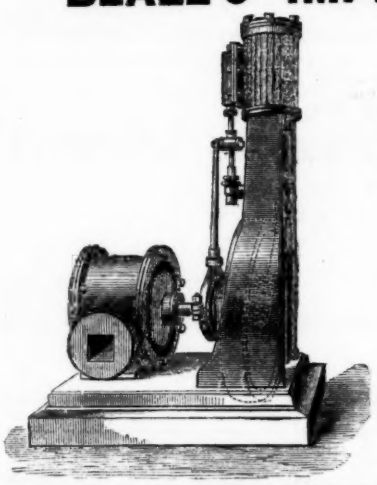
Prices and every information on application.

FIG. 225.

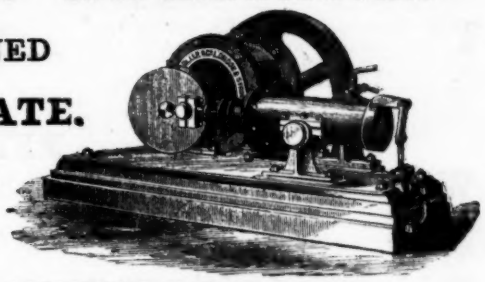
Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,
CAN BE HAD ON APPLICATION TO
GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.
G. & Co. are now manufacturing for a London Gas Company three of their 210,000 cubic feet Patent Gas Exhausters, and many of all sizes.

BEALE'S IMPROVED PATENT GAS-EXHAUSTER



WITH
ENGINE COMBINED
ON
ONE BASE PLATE.
SOLE MAKERS,
GEORGE WALLER & CO.,
Who, since Mr. BEALE'S retirement, are the Oldest Makers.



EXHAUSTERS with HORIZONTAL ENGINE combined.
EXHAUSTERS with OUTSIDE BEARINGS.
MAKERS of ENGINES, BOILERS, and GAS MACHINERY.
TAR, LIQUOR, and SYPHON PUMPS. GAS-VALVES in stock, 2 to 30 inches.
SELF-ACTING BYE-PASS VALVES, with Lid and Relieving Lever.
MANN'S and many other descriptions of WATER DISTRIBUTORS.
SCRUBBERS, PURIFIERS, and CONDENSERS.
EXHAUSTERS from 3000 to 60,000, new and second hand, in stock.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, S.E., & at STROUD, GLOUCESTERSHIRE.

D. BRUCE PEEBLES & CO.,
ENGINEERS,
FOUNTAINBRIDGE WORKS, EDINBURGH,
MANUFACTURERS OF WET AND DRY GAS-METERS;
Patentees and Sole Manufacturers of PEEBLES' LAMP-GOVERNORS,
ABOVE 30,000 OF WHICH ARE NOW IN USE.
"These Lamp-Governors are so superior that they are likely to supplant all others."—*Dr. Wm. Wallace, F.R.S., F.C.S.*
D. BRUCE PEEBLES AND CO., FOUNTAINBRIDGE WORKS, EDINBURGH.

WANTED, by a steady, respectable young Man, a situation as METER INSPECTOR, Meter Fitter and Fixer. Would be willing to assist in service-laying or as storekeeper. Good references.
Address No. 176, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a steady, industrious Man, who thoroughly understands the manufacture of gas, for a small country Gas-Work. Another man kept during the four winter months.
Apply to G. S. FURNIVALE, Bradley Green, near CONGLETON.

TO GAS ENGINEERS.
WANTED, for a Railway in the North of England, a competent Man as SUPERINTENDENT over several small Gas-Works. He must thoroughly understand the manufacture of gas, erection of works, laying of mains, and maintenance and repairs of fittings.
Address No. 175, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, in September next, a re- engagement as MANAGER, or Secretary and Manager, of a Gas-Work. Advertiser has had 15 years practical experience in every branch of the works and in carrying out alterations and extensions. First-class testimonials.
Address No. 172, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Bricklayer, as a Retort- Setter, and for the general repairs of a Gas-Work. To a steady and good workman the situation will be permanent.
Address, stating wages required, and references, to No. 174, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gas Company, a good GAS-FITTER, for general house work or repairs. To an experienced and steady man the employment will be permanent.
Address to No. 173, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C., stating wages required and giving references.

WANTED, a situation to Manage a small Gas-Work. Advertiser is competent to lay mains, services, fix meters, and all that may be required, and is a good stoker; or would accept a situation as Stoker. Reference to present and previous employers.
Apply to No. 2, Gas-Works, BUXTON.

TO WORKING FOREMEN.
WANTED immediately, at a small Gas- Work in Suffolk, a MAN accustomed to the use of an engine and exhauster, to lay mains and services, do general repairs, and make himself useful as required. A smith preferred. House and gas found.
Address, stating age and wages required, with testimonials or references, to No. 178, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, two second-hand Purifiers, about 5 ft. square, with valves, &c., complete, 5-in. or 6-in. connexions; also a set of pipe or annular Condensers to match.
Send particulars and price to Mr. KINSMAN, Boulsdon, near GLOUCESTER.

BELFAST CORPORATION GAS-WORKS.
WANTED, an Assistant Manager, who must be thoroughly acquainted with the manufacture and distribution of gas, and be able to undertake the control of the works in every department under the direction of the Manager.
Applicants to state age and experience, where last employed, and when they could enter upon the duties of the office, and to furnish testimonials to the Town-Clerk on or before the 28th inst. Salary £250 per annum.
Any further information may be obtained from James Steilfox, Jun., Esq., Gas-Works, Belfast.
JAMES GUTHRIE, Town-Clerk.
Town-Hall, Belfast, July 6, 1875.

NEW EDITION, NOW READY,
ADVANTAGES OF GAS FOR
COOKING AND HEATING.
By MAGNUS OHREN, A.I.C.E., F.C.S.
For Companies to issue to their Gas Consumers.
Specimen Copy by post Threepence, direct from MAGNUS OHREN, Gas-Works Lower Sydenham, London, S.E.

WANTED, a Working Manager for the Wymondham Gas-Works. Cottage, coals, and gas free.

Apply, stating wages required, and enclosing testimonials, to ARTHUR GLASSPOOLE, Secretary, Wymondham, NORFOLK.

WANTED, an honest and trustworthy Man as WORKING MANAGER for a Gas-Work where the make is under 4 millions (assistance provided during the winter months). Must thoroughly understand the whole routine of gas-making, main and service laying, meter-fixing, &c. Wages 24s. per week, with good house and garden, fuel, and gas.

Application, in writing, accompanied with testimonials as to character and abilities, to be addressed to the SECRETARY, the Gas Company, Whetstone, near LEICESTER.

TO MANAGERS OF GAS-WORKS.

WANTED, at once, a Working Manager for a small Gas-Work in Kent. In addition to the ordinary duties of laying mains and services, and executing general repairs, the person appointed will have to take the meters and prepare a weekly balance-sheet of the income and expenditure. He will not be permitted to undertake any private work, but will be required to devote his whole time to the duties of his office. The salary will be £100 per annum, without residence or any other privileges.

Applications, in the handwriting of the candidate, enclosing testimonials (copies only, which cannot be returned) as to character and competency, of recent date, and including one from last employer, may be addressed to Mr. W. PARHAM, Clerk to the Urban Sanitary Authority, MILTON-NEXT-SITTINGBOURNE.

Candidates who are considered eligible will be communicated with, and, if required to appear personally before the Board, second-class fare will be allowed.

Milton-next-Sittingbourne, July 7, 1875.

REQUIRED, a practical Gas-Fitter, Main and Service Layer, capable of repairing wet and dry meters. Good wages will be paid to a sober, industrious workman.

Applications may be forwarded, stating age and former places of employment, to No. 177, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Advertiser, aged 28, having over eleven years experience in both in and out door work, main and service laying, testing same, &c., desires a RE-ENGAGEMENT. Also uses the photometer. Good testimonials. Lately returned from abroad, and no objection to proceed abroad again.

Address No. 159, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TAR.

WANTED, Offers for the surplus Tar produced until the 30th of June, 1876, at Aldershot Gas-Works (about 16,000 gallons), received at Tougham or Nine Elms. Buyer supplying casks.

Address MANAGER, Aldershot Gas and Water Company, ALDERSHOT.

THE Corporation of Salford require an experienced ENGINEER and Manager, to take charge of the Gas-Works of the Borough. The gentleman appointed will be required to devote the whole of his time to the duties of his office. Salary £500 per annum.

Applications, endorsed "Gas Manager," with testimonials, to be sent to me on or before Tuesday, the 20th inst.

By order,
CHRIS. MOORHOUSE, Town-Clerk.

Town-Hall, Salford, July 1, 1875.

FOR SALE—A 4-horse Engine and Ex- HAUSTER, to pass 10,000 cubic feet per hour. Self-acting bye-pass and two gas-valves, 8-in. connexions and exhauster governor.

For further particulars, or to view the same now working, apply at the GAS-WORKS, WALTON-ON-THAMES.

THE Scarborough Gas Company have FOR SALE, in consequence of removing to their New Works, a first-class Telescope GASHOLDER, 52 ft. in diameter and 44 ft. deep. It was made and erected by C. and W. Walker, of Donnington, in 1868, and is in excellent condition. It is of remarkably good workmanship, being perfectly circular and true, and free from all irregularities. The columns and girders are of handsome design and highest class of work.

Gas Companies wanting a good Gasholder this year will find this an advantageous opportunity.

For further particulars apply to
JAMES MOON, Gas Engineer, Scarborough.

TO TAR DISTILLERS.

THE Directors of the Devonport Gas and Coke Company are prepared to receive TENDERS for the surplus TAR produced at their works for One year, from the 1st of August, 1875.

Tenders to be sent in on or before Tuesday, the 20th of July, 1875, endorsed "Tender for Tar."

The Directors do not bind themselves to accept the highest or any tender.

JOHN WILLING, Secretary.

Gas Offices, Keyham, Devonport.

COAL.

TENDERS are requested for the supply of 1000 tons inland COAL of good quality for gas and coke purposes, delivered at Aldershot Station, L. & S. W. Railway.

1875.—November	. . . . .	200 tons.
December	. . . . .	250 ,,
1876.—January	. . . . .	250 ,,
February	. . . . .	200 ,,
March	. . . . .	100 ,,

Address the MANAGER, Gas and Water Company, ALDERSHOT.

THE St. Day Fire-Brick and China Clay Company, Limited, having largely increased their works, are now prepared to TENDER in any quantity for the supply of their well-known BRICKS and other FIRE GOODS, either for the Home trade or exportation. Prices and samples will be forwarded on application to the works, St. Day, CORNWALL, or the London Offices, 7, St. Bene't Place, GRACECHURCH STREET.

WOLSTON'S TORBAY IRON PAINTS.

THE Torbay and Dart Paint Company, Limited, 23, Great George Street, Westminster, S.W., having been informed that PAINTS not manufactured by them are being offered to Gas Companies and the public as "WOLSTON'S," hereby give notice that they will TAKE PROCEEDINGS against any persons infringing their rights as sole proprietors and manufacturers of Wolston's Torbay Iron Paints.

(See Advertisement on another page.)

TO GASHOLDER MAKERS.

THE Commissioners for executing the Town of Burton-on-Trent Act, 1853, are prepared to receive TENDERS for the construction and erection, at their Gas-Works, at Burton-on-Trent, of a Telescopic GASHOLDER, 100 ft. in diameter.

Drawings may be inspected, and specifications and forms of tender may be obtained, at the Office of Mr. Mudie, the Manager of the Gas-Works, in Burton-on-Trent, and at the Office of Messrs. Thomas and Charles Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., on and after Monday, the 5th day of July next, and tenders must be delivered to me at the Office of the Commissioners, at or before Ten o'clock in the forenoon on Friday, the 23rd day of July next.

The Commissioners do not pledge themselves to accept the lowest or other tender.

By order,
T. N. WHITEHEAD, Clerk to the Commissioners.
Burton-on-Trent, June 30, 1875.

EXHIBITION OF SANITARY AND EDUCATIONAL APPLIANCES in connexion with the SOCIAL SCIENCE CONGRESS to be held at BRIGHTON, from the 6th to the 16th of October next.

Apply to Mr. JAS. ROBINSON, Secretary to the Managing Committee, 1, Adam Street, ADELPHI, W.C.

WATER-MAINS.

COTTERILL'S PATENT STEEL TUBE- DRILLS, for connecting services to water-mains, *under pressure*, without turning off the water. They drill and tap themselves, and are left in the mains. Made of all sizes, from ¾ to 2 inches and upwards. They cost less than the ordinary plan.

Apply to CHARLES FORSTER COTTERILL, Cannock, STAFFORD, Patentee.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 CANNON Street, E.C.

THE BRITISH ASSOCIATION OF GAS MANAGERS
AND THEIR FRIENDS.

A First-Class PHOTOGRAPHIC GROUP of the above, 12 in. by 10 in.,

TAKEN ON THE OCCASION OF THEIR

ANNUAL PIC-NIC AT STUDLEY ROYAL, RIPON, YORKSHIRE,

JUNE 10, 1875.

COPIES OF THE ABOVE SENT ON ROLLER, POST FREE, TO ANY ADDRESS, PRICE 3s. 6d. EACH.

WM. CHILD, PHOTOGRAPHER, WELLINGTON STREET, LEEDS.

Now Ready, price 10s. 6d.,

AN ANALYSIS OF THE

METROPOLITAN GAS COMPANIES ACCOUNTS

FOR 1874,

(In continuation of the five previous Years, 1869—1873,)

COMPILED AND ARRANGED BY JOHN FIELD,

CHIEF ACCOUNTANT TO THE IMPERIAL GAS COMPANY.

Can be had of the AUTHOR, at 26, ARUNDEL SQUARE, ISLINGTON, per post,

OF

WM. B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.,

AND OF

EDEN FISHER, STATIONER, 50, LOMBARD STREET, LONDON, E.C.

SAM. CUTLER & SONS,

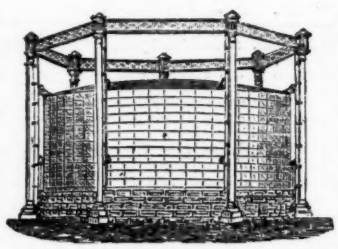
CONTRACTING GAS ENGINEERS,

GASHOLDER & GENERAL GAS APPARATUS MAKERS,

MANUFACTURERS OF

BOILERS, IRON ROOFING, IRON BRIDGES,

AND GENERAL IRONWORK.



S. C. AND SONS undertake Contracts of any magnitude for the **Erection of new and Remodelling of existing Gas-Works**, for **Gasholders, Cast and Wrought Iron Tanks, Iron Roofs**, and every description of **Apparatus** for the Manufacture and Distribution of Gas.

Special attention is invited to their **"Improved Condenser,"** which is very effective, and much approved; also to their patterns of **Annular** and other **Condensers, Scrubbers**, and **Purifiers**, of all sizes, which they arrange either with **Centre** or Ordinary **Slide Valves.**

WORKS FOR THE SUPPLY OF

VILLAGES, MANSIONS. FACTORIES, &c.

S. C. AND SONS undertake the **Supply** and **Laying** of **Mains** for **Gas and Water**, and supply all Castings, Connexions, and Fittings for Retort-House, Works generally, and for Streets. They also supply **Valves** of all descriptions, Iron and Clay Retorts, Hotpressed Retort-Lids, Steel Charging-Scoops of improved make, for which they have special machinery, Improved Coke and Coal Barrows, Cross-Bars and Screws, Bolts and Nuts, Furnace and Stoking Tools, Iron and Wood Purifier-Sieves, Lead, Yarn, Borings, &c., including every requisite whatsoever for a Gas-Work, a well-assorted stock being kept of those goods most in request.

SOLE MAKERS OF BRETT'S PATENT COKE BARROW.

Experienced Retort Setters sent to any part of the Kingdom.

Address: PROVIDENCE IRON-WORKS, MILLWALL, LONDON.

MESSRS. JOHN BETHELL & CO.,

(ESTABLISHED 1836,)

CONTRACTORS for GAS TAR,

MAKERS OF ANTHRACENE, CREOSOTE, &c.,

CLAYTON CHEMICAL WORKS, MANCHESTER;
SWAN VILLAGE, WEST BROMWICH.

Head Offices: 38, KING WILLIAM STREET, LONDON BRIDGE.

ALFRED WILLIAMS,

PHŒNIX FIRE-BRICK WHARF,

64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

LIME SUPERSEDED

IN THE

PURIFICATION OF ILLUMINATING GAS

BY

SPENCE'S PATENT DRY COPPERAS.

The only purifying material which removes by one process, without injury to the purifiers, all Ammonia and Sulphuretted Hydrogen. It has been in use for upwards of five years at some of the largest Gas-Works in the Kingdom.

TESTIMONIALS SENT ON APPLICATION TO

SPENCE BROTHERS CHEMICAL COMPANY, LIMITED,
VICTORIA CHEMICAL WORKS, BRADFORD, MANCHESTER;

SOLE MANUFACTURERS OF SPENCE'S PATENT DRY COPPERAS,
SPENCE'S PATENT GAS DEODORIZER, AND MUDIE'S DISINFECTANT;
MANUFACTURERS OF
SULPHATE OF AMMONIA, VITRIOL, COPPERAS, &c.;
PURCHASERS OF SPENT OXIDE AND AMMONIACAL LIQUOR, AND CONTRACTORS FOR THE PURIFICATION OF COAL GAS.

GEORGE NEWTON,

UNION STREET WEST, OLDHAM,

MANUFACTURER OF

SQUARE STATION-METERS, with PLANED JOINTS;
ROUND STATION-METERS, WITH CAST-IRON STANDS;
WET AND DRY CONSUMERS GAS-METERS, GOVERNORS, &c.

TO IRONFOUNDERS & COKE CONSUMERS.

THE Directors of the Blackburn Gaslight Company are prepared to receive TENDERS for 1000 to 5000 tons of good GAS COKE, which they will be prepared to supply in such quantities as may be agreed upon from time to time.

Endorsed tenders, stating price per ton delivered at the Gas-Works, Blackburn, must be addressed to Joseph Harrison, Esq., Chairman of the Company, and sent in on or before the 15th inst.

The highest or any tender not necessarily accepted.

By order,
W. B. EMMERSON, Engineer and Manager.

TO CONTRACTORS.

THE Commissioners for executing the Town of Burton-upon-Trent Act, 1853, are prepared to receive TENDERS for the construction of a GAS-HOLDER-TANK, 103 ft. in diameter, at their Gas-Works, at Burton-on-Trent.

Drawings and specifications may be inspected, and forms of tender and schedules of quantities may be obtained, at the Office of Mr. Mudie, the Manager of the Gas-Works, in Burton-on-Trent, and at the Office of Messrs. Thomas and Charles Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., on and after Monday, the 5th day of July next, and tenders must be delivered to me at the Offices of the Commissioners, at or before Ten o'clock in the forenoon, on Friday, the 23rd day of July next.

The Commissioners do not pledge themselves to accept the lowest or other tender.

By order,
T. N. WHITEHEAD, Clerk to the Commissioners.
Burton-on-Trent, June 30, 1875.

LEEDS CORPORATION GAS-WORKS.

THE Gas Committee of the Corporation are ready to receive TENDERS stating the price per ton at which the Contractors will engage to supply them with TURNED and BORED and other PIPES, Bends, Branch Pipes, Syphon Wells, and other irregular Pipes, which they may require during the next twelve months.

Pipes of 16-in. bore to average 340 lbs. per yard.

,,	14-in.	,,	,,	252	,, ,,
,,	12-in.	,,	,,	208	,, ,,
,,	10-in.	,,	,,	168	,, ,,
,,	8-in.	,,	,,	140	,, ,,
,,	7-in.	,,	,,	106	,, ,,
,,	6-in.	,,	,,	89	,, ,,
,,	5-in.	,,	,,	69	,, ,,
,,	4-in.	,,	,,	51	,, ,,

To be delivered at the Railway Terminus in Leeds.

Tenders to be sent to my Office not later than Thursday, the 15th of July next, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Pipes."

The lowest or any tender will not necessarily be accepted.

By order,
C. A. CURWOOD, Town-Clerk.
Leeds, June 25, 1875.

BOROUGH OF LEEDS.

TO COALOWNERS.

THE Gas Committee of the Corporation are now ready to receive TENDERS for the supply of CANNEL and Best GAS COALS.

Each party tendering to state the quantity he will engage to supply, and to quote price per ton delivered at the Gas-Works, York Street, Meadow Lane, or New Wortley, unless the Coals are intended to be conveyed *viâ* Midland, and in that case price per ton to be quoted delivered on the Gas-Works sidings from that railway at Hunslet Lane and Geldard Junction. The Cannel to be well dressed and free from nob, and the Gas Coals to be screened over a 1-inch screen, well dressed, and free from slack and pyrites, and to be delivered in such quantities as the Committee or their Engineer may direct; and the Committee reserve to themselves the right to determine the contract without notice, if at any time the delivery be inferior to the quality contracted for. Period of contract, six, nine, or twelve months, as may be agreed upon.

Tenders to be sent in to my Office not later than Thursday, the 15th of July next, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Coals."

The lowest or any tender will not necessarily be accepted.

By order,
C. A. CURWOOD, Town-Clerk.
Leeds, June 25, 1875.

Will shortly be ready, price 18s., bound in cloth, lettered,

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(JANUARY TO JUNE, 1875)

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INVENTOR OF THE DRY GAS-METER,

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TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

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MANUFACTURE AND DISTRIBUTION OF GAS. These sheets are the same as were laid before the Dublin Meeting of the British Association of Gas Managers; but in the REPRINT, NOTES have been added for the guidance of those using them. Copies of the two sheets may now be had, price 5s.

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IN THE MATTER OF BRONNER'S PATENT BURNERS.

NOTICE is Hereby Given that Julius Brönner, on the 20th of April, 1875, in a suit in Chancery, 1874, B 365, obtained an injunction perpetually restraining the Defendant, his Agents, Servants, and Workmen, from in any way advertising or offering for sale, or selling, or from in any manner causing to be advertised, or offered for sale, or sold as "Real Brönner," or "Brönner," or "Broehner" Burners, any Burner not manufactured by or for the Plaintiff, Julius Brönner, or by his Agents.

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JULIUS BRÖNNER, Frankfort-on-Maine.

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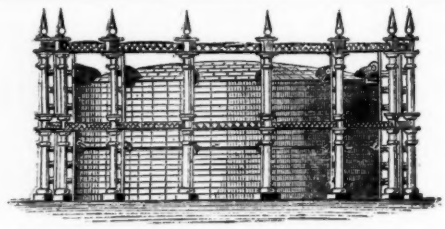

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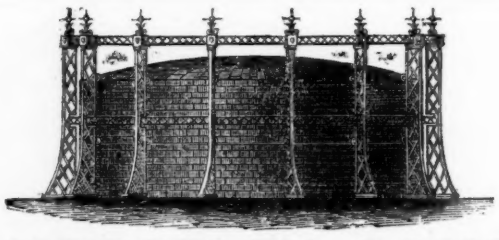

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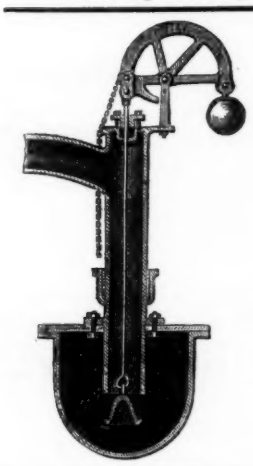

BOX'S PATENT ANTI-DIP VALVE

Affords a clear gas way through the dip-pipe while the retort is in action, and produces a perfect seal at pleasure, or whenever the retort is open, offering great security against the drawing of air, and obviating the necessity for using any liquid in the now so-called hydraulic main. It is easy of application to existing apparatus, and is comparatively inexpensive. Is not likely to get out of order, as the tar, which will adhere to the botton of the dip-pipe and the flange of the cone, both of which are faced, will act as a lubricant, and prevent undue wear and tear. The whole, as will be seen on inspecting the accompanying illustration, is exceedingly simple, and every part accessible. To adapt it to the present dips, all that is necessary is to face the bottom edge of the dip-pipe, and suspend a cone by a rod, which passes through the bonnet, the raising and lowering of the cone being performed through the intervention of a weighted eccentric.

The Patentee is prepared to supply Patented Apparatus upon the most moderate terms, and will be happy to reply to any inquiries that may by adddressed as under—

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E. KÖRTING'S PATENT STEAM-JET GAS-EXHAUSTER.

Small Cost—Compactness—Perfectly Self-Acting—Self-Regulating—Self-Cleansing—Smallest Boiler Pressure Sufficient—No Steam-Engine—No Gearing—No Attention—No Extra Room Required—No Tear and Wear—No Noise—No Oscillation in Vacuum, or Back Pressure.

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These Gas-Exhausters are kept in stock in 16 different sizes, delivering from 500 cubic feet to 60,000 cubic feet of Gas per Hour.

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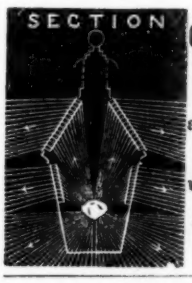

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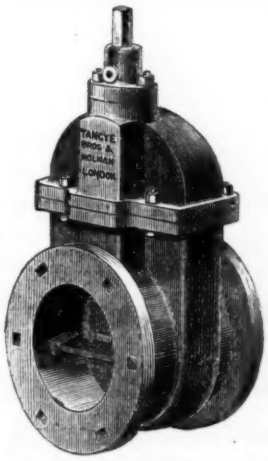

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7	63	0
8	80	0
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Bronze Green.	Salmon Colour.
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All other Colours made to order.

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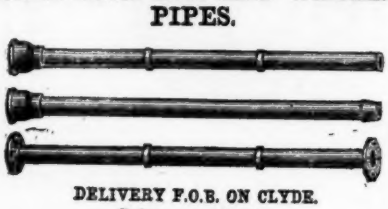
18 & 20, ALSTON STREET, GLASGOW.
CAST-IRON GAS AND WATER PIPES.



DELIVERY F.O.B. ON CLYDE.
Prices on application.

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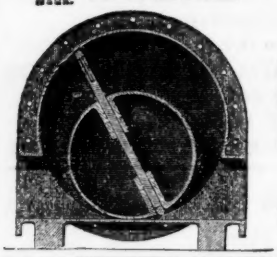
J. BEALE'S PATENT GAS EXHAUSTER.

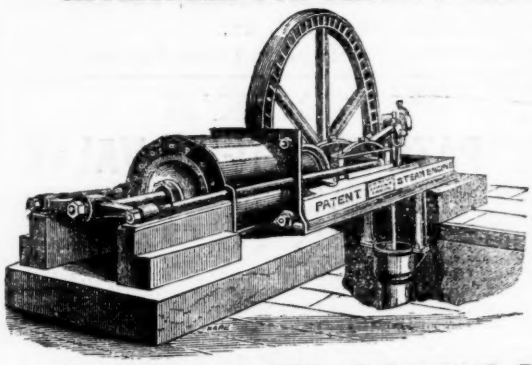


BEALE'S CONTINUOUSLY ACTING
GAS EXHAUSTERS
ARE NOW MANUFACTURED BY
B. DONKIN & CO.

MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.
B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise, and Gas-Valves.

Estimates and Prices on application to
B. DONKIN & CO.,
ENGINEERS & IRONFOUNDERS,
BERMONDSEY, LONDON, S.E.

ECONOMY OF FUEL IN STEAM-ENGINES.
B. DONKIN & CO.,
PATENT HORIZONTAL COMPOUND CONDENSING
STEAM-ENGINES,
APPLICABLE FOR DRIVING GAS-EXHAUSTERS.

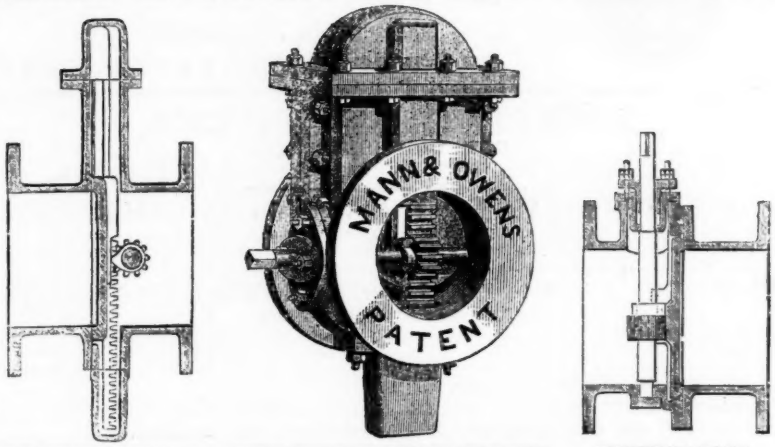


These Engines have been at work a sufficient number of years to prove their durability and efficiency.

One of them has been subjected to a scientific and exhaustive trial to test the consumption of fuel, with the result that an expenditure of less than **2 lbs.** of coal per hour developed one indicated horse power.

Full Details of this Trial, and Prices, sent on application to
B. DONKIN & CO., BLUE ANCHOR ROAD, BERMONDSEY, S.E.

MANN & OWENS' PATENT GAS-VALVE.



SECTIONAL ELEVATION. VIEW SHOWING PINION AND RACK. SECTIONAL PLAN.

The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.

The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.

The slide being operated either by a screw and nut, or by a pinion and rack, a cam bearing upon a plane, cast on the back of the Valve, forces it against the face, and renders the escape of gas an impossibility. By a slight turn of the pinion or screw, the slide is released, and brought away from the face, by which means friction is avoided, and the only force required to open the Valve is that due to its own weight.

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GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

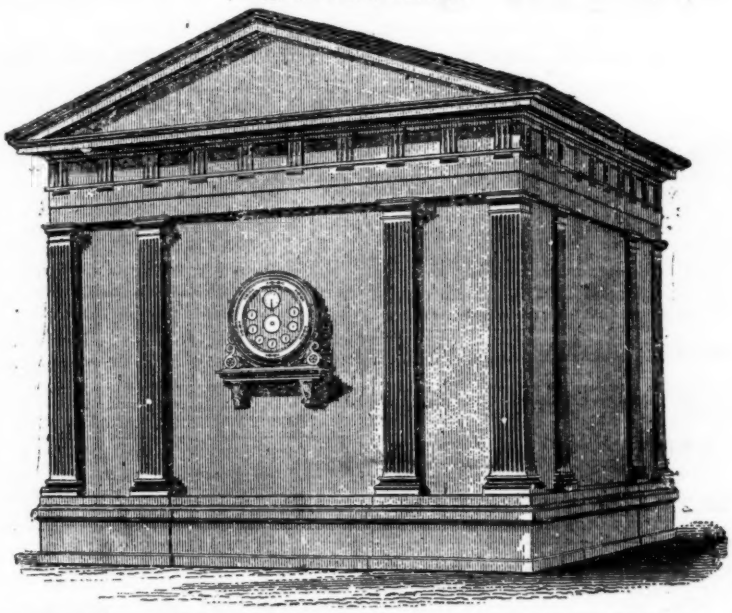
MANUFACTURERS OF

WET & DRY CONSUMERS GAS-METERS

OF THE HIGHEST EXCELLENCE;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

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GAS COOKING APPARATUS.

Home and Foreign Orders promptly attended to.

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Orders almost invariably despatched on the day of receipt.

TERMS, &c., ON APPLICATION.

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PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS, heated by tar without the production of smoke.

STEAM-ENGINES and EXHAUSTERS, separately or combined.

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A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress of the construction of Works, post free, 2s. 6d.

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INTERNATIONAL EXHIBITION, 1862.

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PRESENT PRICE:

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8s. 9d. ,, F.O.B.

Cubic Feet.	Illuminating Power.	Coke (sup. qual.).
10,000 ..	20 candles. ..	12 cwt.

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Beg leave to call the attention of Gas Companies to the superior quality of their

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This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

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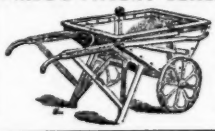

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STRONGLY RECOMMEND A TRIAL OF THEIR

CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

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CAN OFFER A
GAS COAL
Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	10,775
Weight of coke in lbs. per ton of coal	1,465

ANALYSIS AND PRICES ON APPLICATION TO
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COMPANY, LIMITED.
Works: LOCHORE by LOCHGELLY, FIFESHIRE. Office: 19, MAITLAND STREET, EDINBURGH.

This Company request attention to the very superior quality of their Cannel Coals.

1. The following are the practical results given by Dr. Wallace, of Glasgow, of analyses of their Lochore and Capledrae Cannels:—

	Sample worked at Capledrae.		Sample worked at Lochore.
Gas per ton of coal, at 60° Fahr. and 30 inches barometric pressure . .	13,095 cubic feet.	..	11,760 cubic feet.
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	32·91	..	34·83
Value of 1 cubic foot of gas in grains of sperm	780	..	836
Equivalent of a ton of coal in pounds of sperm candles	1,459	..	1,404
Durability of 1 cubic foot by 5-inch flame	69 minutes.	..	71 minutes.
Gravity of the gas (air = 1000)	596	..	594

Remarks.—This (the sample from Capledrae) is a Cannel Coal of first-class quality, giving 13,000 feet of 33-candle gas. It contains only a minute proportion of sulphur, and the ash is almost quite white. The coke is of rather inferior quality.

Remarks on Sample from Lochore.—This is a Cannel Coal of first-class quality, giving a large yield of very rich gas and a coke of medium quality.

2. The following are the practical results of analyses by Dr. Wallace of the Company's Waverley Cannels:—

	Capledrae Waverley.		Lochore Waverley.
Gas per ton of coal, at 60° Fahr. and 30 inches barometer	9,120 cubic feet.	..	11,145 cubic feet.
Illuminating power, in standard candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	36·62	..	33·09
Value of 1 cubic foot of gas in grains of sperm	878	..	794
Equivalent of a ton of coal in pounds of sperm candles	1,145	..	1,264
Durability of 1 cubic foot of gas by 5-inch flame	80 minutes.	..	67 minutes.
Gravity of the gas (air = 1000)	677	..	597

Remarks on the Sample of Capledrae Waverley.—This Coal gives fully 9000 feet of gas of 36½ candles, and is admirably adapted for bringing up the quality of gas made from common coal or inferior qualities of cannel. The tests were made at a rather high temperature, this being one of the coals that stand a very high heat without serious diminution of the illuminating power of the gas The coke contains 60 per cent. of ash, and is therefore almost valueless, but the proportion of sulphur is very moderate.

Remarks on the Lochore Waverley.—This is a first-class Cannel Coal, giving 11,000 cubic feet of 33-candle gas. The quantity of sulphur is very minute, and the ash is nearly white. The coke is of inferior quality, but not wholly valueless.

Applications for full Copies of Analyses and Prices may be made to the Company, at
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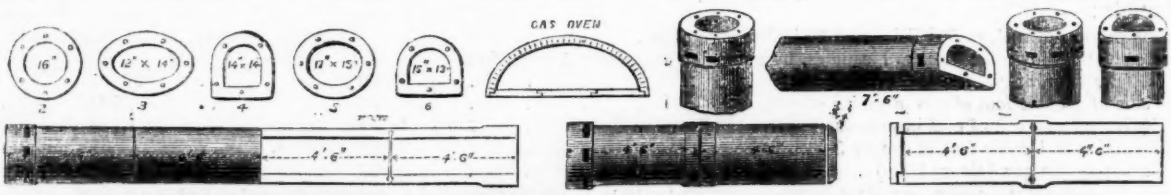

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